Journal of the Kansas Entomological Society

(Central States Entomological Society)

Vol. 27 July, 1954 Number 3

PUBLICATION COMMITTEE

MARY H. MICHENER, Editor, Lawrence

R. H. BEAMER, Lawrence R. H. PAINTER, Manhattan

DWIGHT ISELY, Fayetteville, Ark.

PAUL BOWEN LAWSON
1888-1954

Entered as second-class matter June 7, 1939 at the Post Office at Manhattan, Kansas, under the Act of August 24, 1912.

JOURNAL OF THE KANSAS ENTOMOLOGICAL SOCIETY

A quarterly journal published in January, April, July, and October devoted to Entomology in the Western Mississippi Basin and the proceedings of the Kansas Entomological Society.

Manuscripts for publication may be sent to the Editor, Mary H. Michener, care of Department of Entomology, University of Kansas, Lawrence, Kansas or to any member of the publication committee.

The Kansas Entomological Society does not make exchanges since the Society does not maintain a library.

Subscriptions to the Journal must be paid in advance. The subscription rate is so low that second notices are not ordinarily sent out.

Payment of Canadian or other foreign subscriptions and bills must be made by international Postal Money Order or by a draft on a New York bank and payable in U.S.A. dollars.

Subscribers are urged to give us their full cooperation in these matters.

Subscriptions should be sent to Donald A. Wilbur, Department of Entomology, Kansas State College, Manhattan, Kansas.

Subscriptions in the U.S.A.	**$2.00 per year**	**Single Copy**
Canadian or foreign subscriptions,	**$2.25 per year**	**75 cents**

KANSAS ENTOMOLOGICAL SOCIETY

President, HERBERT KNUTSON
Vice-President, FLOYD D. MINER
Secretary-Treasurer, DONALD A. WILBUR

Vol. 27, No. 3, July 1, 1954

This issue mailed July 24, 1954

Kansas Entomological Society
Vol. 27 July, 1954 Number 3

PAUL BOWEN LAWSON

Paul Bowen Lawson was born August 18, 1888, in Sitapur, India, where his parents were Methodist missionaries. He died March 30, 1954.

His early education was in an English boarding school in India where disciplines of both mind and body were thorough! He came to the United States in 1903 and was graduated from Oberlin, Ohio high school in 1905. He attended Oberlin College one year and received the BS degree from John Fletcher College at University Park, Iowa in 1909, where he was instructor in biology from 1910 to 1915. Before coming to University of Kansas as a graduate student in the fall of 1915 he had taken an informal summer course in entomology under Dr. W. S. Marshall at the University of Wisconsin. Besides taking all the regular courses in entomology offered at K.U., he was with the Biological Survey party for the first six weeks of Summer school 1916 and returned to the campus to take the three weeks' course in General Economic Entomology taught by Prof. George A. Dean of Manhattan.

In the fall of 1916 he became assistant instructor in entomology and received his MS degree in 1917 with "The Coccidae of Kansas" as his thesis. In September 1917 he became instructor and continued his work toward a Ph.D. studying the Cicadellidae of Kansas, in which connection he spent some time in Columbus, Ohio, studying Cicadellidae informally with Dr. Herbert Osborn.

After receiving his Ph.D. degree in 1919 from the University of Kansas, his advancement was phenomenally rapid: To assistant professor in 1920; to associate professor in 1921; to Professor of Entomology and assistant dean of the College of Liberal Arts and Sciences in 1922. In the summer of 1922 he taught entomology at the University of Minnesota and in another summer taught General Biology at Cornell University—facts not mentioned in his biography in Who's Who in America. In 1929 he became associate dean, in 1933, acting dean, and in 1934 dean of the College of Liberal Arts and Sciences—a position he held at the time of his death.

He carried a full teaching load in entomology until he became dean (1934) and then continued to teach one or two courses a year throughout his deanship. While only one short entomological note and two papers with Dr. Beamer were published after 1934 his interest in entomology never waned. He was the first president of the Kansas Entomological Society, chairman of the publication committee of the Journal of the Kansas Entomological Society from its beginning in 1928, and its editor from volume 3 to volume 27, No. 1. Our society has lost a most valuable member and our department of entomology at K.U. a grand and friendly colleague who was to retire from administrative duties on July 1st. He planned to spend fourteen months on a round-the-world trip with his wife for his first sabbatical leave in thirty-eight years, and then to return to teaching entomology and to the research he had sacrificed for what he believed to be a greater service. There can be no doubt that he was giving up the deanship with relief and looking forward with pleasure to the return to full time in entomology.

At the time of his death the Lawrence Daily Journal World, the University Daily Kansan, the Kansas City Star, the Topeka Daily Capital, and the University of Kansas Alumni Magazine carried stories about him, his family, and his splendid contributions to his neighborhood, to his city, to his university and to his state. I have chosen therefore to record that Paul B. Lawson, my student, my close friend and beloved colleague was also a well known entomologist and a specialist in the Homoptera. It must be remembered that, besides the list of his papers given below, he interested Doctors R. H. Beamer and Kathleen Doering in the study of the Homoptera and started a chain reaction in the Department of Entomology at the University of Kansas that has produced a number of specialists and contributed several hundred papers to our knowledge of the Homoptera.

PAPERS BY P. B. LAWSON

1917. The Coccidae of Kansas. Bull. of Dept. of Entomology, Univ. of Kansas, No. 11, pp. 161-279; 103 figures.
1920. The Cicadellidae of Kansas. Science Bull. XII, No. 1, pp. 1-306; 17 plates.
1920. The Cicadidae of Kansas. Science Bull. XII, No. 2, pp. 306-376, 10 plates.
1922. List of the Cicadellidae of Kansas. Trans. Kans. Acad. Sci. XXX, pp. 331-336.
1922. List of the Grasses of Douglas County. Trans. Kans. Acad. Sci. XXX, pp. 336-339.
1922. The Membracidae of Kansas. Science Bull. XIV, pp. 27-110; 7 plates.
1922. The Genus Acinopterus (Cicadellidae). Science Bull. XIV, pp. 111-139; 5 plates.
1926. Some Biting Leafhoppers. Ann. Ent. Soc. Amer. XIX, pp. 73-74.
1927. The Genus Jassus in America North of Mexico (Cicadellidae). Can. Ent. LIX, pp. 167-174.
1927. New Species of Acinopterus (Cicadellidae) No. 2. Ann. Ent. Soc. Amer. XX, pp. 232-241.
1928. The Genus Driotura Osborn and Ball and the Genus Unoka Gen. Ann. Ent. Soc. Amer. XXI, pp. 449-462.
1929. Concerning Cicadella hieroglyphica var. dolobrata Ball. (Cicadellidae). Can. Ent. LVI, pp. 69-70.
1929. A Leafhopper Parasite - Polynema saga (Girault) Ann. Ent. Soc. Amer. XXII, p. 130.
1929. Leafhoppers and the Trap Light. Jl. Kans. Ent. Soc. II, pp. 39-47.
1929. The Genus Dikraneuroidea Gen. New. (Cicadellidae). Bull. Brooklyn Ent. Soc. XXIV, No. 5, pp. 307-309; 1 plate.
1930. Two new Alconeura (Cicadellidae) with Notes on Other Species. Bull. Brooklyn Ent. Soc. XXV, No. 1, pp .44-47.
1930. Concerning Scolops cockerelli (Fulgoridae) Can. Ent. LXII, pp. 120-122.
1930. Some New Dikranеura (Cicadellidae) with Notes on Other Species. Can. Ent. LXII, pp. 35-42.
1930. Another Season's Trap-Lighting of Leafhoppers. Jl. Kans. Ent. Soc. III, No. 2, pp. 35-43.
1930. Three New Leafhoppers from the Southwest (Cicadellidae). Pan-Pacific Ent. VI, No. 3, pp .135-137, figures 2-2b.
1931. The Genus Drylix in North America (Cicadellidae). Annals. Ent. Soc. Amer. XXIV, No. 3, pp. 587-590; 1 plate.
1931. The Genus Xerophloea (Cicadellidae) in North America. Pan-Pacific Ent. VII, No. 4, pp. 159-169; 1 plate.
1931. Three New Species of Acinopterus with Notes on Other Species (Cicadellidae). Jl. Kans. Ent. Soc. IV, No. 3, pp. 59-61.
1932. The Genus Alapus. (Cicadellidae). Jl. Kans. Ent. Soc. V, No. 1, pp. 29-31, 1 plate.
1932. The Genus Tinobregmus (Cicadellidae) Ann. Ent. Soc. Amer. XXV, No. 2, pp. 359-365; 1 plate.
1932. The Genus Spangbergiella (Cicadellidae) in America, North of Mexico. Jl. Kans. Ent. Soc. V, No. 4, pp. 116-122; 1 plate.
1933. The Genus Fitchiella (Fulgoridae). Bull. Brooklyn Ent. Soc. XXVIII, No. 5, pp. 194-199; 1 plate.

1933. A New Penthimia (Cicadellidae). Jl. Kans. Ent. Soc. VI, No. 1, pp. 34-35; 1 plate.
1933. Notes on the Life History of the Hour-Glass Spider. Annals Ent. Soc. Amer. XXVI, No. 4, pp. 568-574.
1935. A beetle New to Kansas. Jl. Kans. Ent. Soc. VIII, No. 1, pp. 26.
1938. The Genus Acinopterus (Cicadellidae). Ann. Ent. Soc. of America XXXI Vol. 4, pp. 476-488, 3 plates (with R. H. Beamer).
1945. A Revision of the Genus Stragania. (Cicadellidae). Jl. Kans. Ent. Soc. XVIII, No. 2, pp. 49-66; 3 plates (with R. H. Beamer).

H. B. HUNGERFORD

UTAH CELERY FIELD APHIDS — 1952

GEORGE F. KNOWLTON[1] AND HOWARD E. DORST[2]
Utah Agricultural Experiment Station

During the season of 1952, aphids were collected from northern Utah celery fields and mounted on glass slides at the entomology laboratory of Utah State Agricultural College at Logan. Identifications were made by Professor M. A. Palmer, and the names used here follow her book, "Aphids of the Rocky Mountain Region," Thomas Say Foundation.

The aphids are listed below in three groups, according to how or where they were collected. In each group they are listed in decreasing order of the number of times collected.

(1) Aphids breeding on celery plants: *Aphis heraclella* Davis, *Cavariella aegopodii* (Scopoli), *Amphorophora sonchi* (Oestlund), *Myzus persicae* (Sulzer), *Rhopalosiphum conii* (Davidson), *Aphis helichrysi* Kalt., and *A. armoraciae* Cowen.

(2) Aphids collected as accidental alates on celery, by sweeping the plants with an insect net: *Macrosiphum pisi* (Kalt.), *Aphis vorabonnevilla* K.-S., *Macrosiphum granarium* (Kirby), *Aphis tulipae* Boyer, *A. bakeri* Cowen, *A. cardui* L., *A. cerasifoliae* Fitch, *A. sensoriata* G.-B., *A vibrunicola* Gill., *Brevicoryne brassicae* (L.), *Hyalopterus* sp., *Macrosiphum dirhodum* (Walker), *M. pelargonii* (Kalt.), *M. solanifolii* (Ashmead), *Myzocallis* sp., *Myzus solani* (Kalt.), *M. persicae* (Sulzer), *Rhopalosiphum* sp., *Rhopalosiphum nymphaeae* (L.), and *R. rhois* Monell.

(3) Aphids collected on the surface of water in pans painted yellow on the inside: *Hyalopterus atriplicis* (L.) (36 collections), *Pemphigus balsamiferae* Williams (23 collections), *Myzus persicae* (Sulzer) (collected 17 times), *Aphis armoraciae* Cowen (13 times), *Macrosiphum dirhodum* (Walker) (12 times), *Brevicoryne brassicae* (L.), *Capitophorus hippophaes* (Walker), *Aphis heraclella* Davis, *Amphorophora sonchi* (Oest.), *Macrosiphum pisi* (Kalt.) *Aphis gossypii* Glover, *A. medicaginis* Koch, *Colopha ulmisacculi* (Patch), *Aphis valerianae* Cowen, *Cavariella aegopodii* (Scopoli), *A. rumicis* L., *A. frangulae* Kalt., *Hyalopterus arundinis* (Fab.), *Rhopalosiphum conii* (Davidson), *Toxoptera muhlenbergiae* P.-D., *Aphis cardui* L., *A. fabae* Scopoli, *A. helianthi* Monell, *A. nyctalis* H.-F., *A. rubicola* Oest., A. *tahasa* Hottes, *Cavariella* sp., *Eriosoma* sp., *Gobaishia ulmi-fusa* (W.-R.), *Macrosiphum* sp., *M. chrysanthemi* (Oest.), *Myzocallis* sp., *Myzus solani* (Kalt.), *Pemphigus junctisensoriatus* Maxson, *P. populi-caulis* Fitch, *Rhopalosiphum fitchii* (Sanderson), and *R. maidis* (Fitch).

[1]Research professor of entomology.
[2]Entomologist, U.S.D.A., Agr. Res. Adm., Bureau of Entomology and Plant Quarantine.

NOTES ON MEXICAN MELOIDAE (Coleoptera)[1]

RICHARD B. SELANDER

The following is a report on a collection of blister beetles or Meloidae made in Mexico during the summer of 1952. Most of the material was taken by R. K. and B. J. Selander, who made several insect collections when not engaged in ornithological work. Part of the material from Chihauhua was collected by a party consisting of J. M. Selander, Y. Sedman, and myself. A few records of specimens from other sources are included, in which case the collector and source are given, but no attempt has been made to include species not taken during the 1952 trip.

In all, 35 species are included. A few major and several minor extensions of range are recorded. Four species, *Calospasta viridis* Horn, *Epicauta uniforma* Werner, *Linsleya convexa* (LeConte), and *Zonitis punctipennis* (LeConte), are reported from Mexico for the first time. Eight of the species recorded here from Chihuahua, Durango, or Zacatecas were not found by the David Rockefeller Mexican Expedition of the American Museum of Natural History, which collected in these states (and in Coahuila) in 1947 (See Vaurie, 1950).

Host plant records, which have been practically non-existent for Mexican meloids, were secured for a few species. For the determination of plant specimens I want to thank W.P. Cottam, of the University of Utah, and H. E. Ahles, of the University of Illinois.

Specimens of *Pyrota palpalis* Champion and *P. punctata* Casey from the Rockefeller Expedition collection were made available to me through the kindness of Mont A. Cazier and Patricia Vaurie. Mr. W. R. Enns contributed by determining two of the species included.

Synonymy given for each species includes only those references containing original Mexican records or important information and the original description. Distributional data refer only to Mexico. For convenience the genera and species are arranged in alphabetical order.

Calospasta sulcifrons Champion

Calospasta sulcifrons Champion, 1892, p. 394, pl. 18, fig. 14.

This distinctive species was described from three specimens and was previously known only from Venta de Zopilote, 2800 ft., Guerrero, the type locality. Its range marks the southern limit of distribution of the tribe Calospastini. The series recorded here agrees perfectly with Champion's description.

Distribution: Guerrero.

New Record: GUERRERO: 5 miles north-northeast of Mexcala, 2000 ft., August 31 (9 males, 15 females).

Calospasta viridis Horn

Calospasta viridis Horn, 1883, p. 312.

This species has not been recorded from Mexico previously. Specimens ex-

[1] This paper is a joint contribution of the Section of Faunistic Surveys and Insect Identification, Illinois Natural History Survey, and the Department of Entomology, University of Illinois.

amined range from 5 to 11 mm. in length; nearly all are shorter than 8 mm. They are smaller in average size than specimens from New Mexico but otherwise identical.

Specimens were collected on *Helianthus petiolaris* Nuttall, *Linum aristum* Englemann, and *Baileya pleniradiata* Harvey & Gray in a sand dune area. The adults feed on the pollen of these plants. They are very active and fly readily.

Distribution: Chihuahua.

New record: CHIHUAHUA: 44 miles south of Juarez, July 23 (29 males, 27 females).

Cysteodemus wislizeni LeConte

Cysteodemus Wislizeni LeConte, 1851, p. 158.
Cysteodemus wislizeni, Dugès, 1889, p. 40; Vaurie, 1950, p. 60.
Cysteodemus wizlizeni, Champion, 1892, p. 369, pl. 17, fig. 10 (*lapsus calami*).

Megetra vittata and this species were found in the same ecological situations but feeding on different plants. *Cysteodemus wislizeni* was collected on *Aster* sp., *Tidestromia lanuginosa* (Pursh) Moquin-Tandon, and *Kallstroemia parviflora* Norton, or crawling on the sand.

Distribution: Chihuahua, Coahuila, and Durango.

New Records: CHIHUAHUA: 30 miles south of Chihuahua, July 21 (2 males); 2 miles north of Sueco, July 22 (7 males, 3 females).

Epicauta arizonica Werner

Epicauta arizonica Werner, 1944, p. 72; Werner, 1945, p. 507, fig. 39.

Werner recorded this species from Arizpe, Sonora. The present record extends the known distribution east of the Sierra Madre Occidental and southward. The single specimen, collected at light, has the head and abdomen brownish black, the thorax, legs, and maxillary palpi dark brown, and the elytra a lighter, rather reddish brown. The two basal segments of each antenna are a little shorter than the rest combined, and the eyes are much larger than in *E. polingi,* as stated by Werner (1945).

Distribution: Chihuahua and Sonora.

New Record: CHIHUAHUA: 7 miles west of Chihuahua, July 22 (1 male).

Epicauta atrivittata (LeConte)

Lytta atrivittata LeConte, 1854, p. 224.
Epicauta atrivittata, Werner, 1945, p. 509, fig. 24; Vaurie, 1950, p. 35.

One specimen was collected at light. In the United States this species has been recorded from Texas and New Mexico. Among specimens examined recently are three males and three females from Arizona (Illinois Natural History Survey).

Distribution: Chihuahua and Tamaulipas.

New Record: CHIHUAHUA: Ahumada, July 22 (1 male).

Epicauta hirsutipubescens (Maydell)

Macrobasis hirsutipubescens Maydell, 1934, p. 334.
Epicauta hirsutipubescens, Vaurie, 1950, p. 36, fig. 11.

The Chihuahua specimens, which were collected at light, have the body and elytra black, the pubescence gray, and the discal elytral stripe well

marked. Three specimens from Gila Valley, 3 miles southeast of Bylas, Arizona, are much smaller, have unicolorous, pale tannish pubescence, and are suffused with dark brown at the middle of the elytra. In two of the latter the discal stripe is obsolescent. Another specimen from the same locality in Arizona is intermediate in color and size between the Chihuahua and the other Gila Valley specimens.

Distribution: Chihuahua, Coahuila, Durango, and Sonora.

New Record: CHIHUAHUA: 20 miles south of Juarez, 4600 ft., July 19 (4 males).

Epicauta labialis (Dugès)

Cantharis labialis Dugès, 1881, p. 145, pl. 4, fig. 9.
Macrobasis labialis, Dugès, 1889, p. 51.
Gnathospasta labialis, Champion, 1892, p. 403.

This species is closely related to *E. mimetica* (Horn), which is known only from Texas. Both species have unusually large heads, large, vaulted mandibles, and a deep, semicircular emargination on the labrum. In respect to the first two characters they are somewhat like members of the genus *Psalydolytta,* which are found in Africa and India, but the similarities are undoubtedly the result of convergence.

Both species are rare. Champion had only three specimens of *E. labialis,* from the type locality, for his Biologia report. *Epicauta labialis* agrees with *E. mimetica* in most details, but it has much finer pubescence, which is entirely black, instead of cinereous or tannish. In the specimen of *E. labialis* collected during the 1952 trip the hind tibial spurs are subequal in size and shape. In *E. mimetica* the lateral hind tibial spur is noticeably heavier than the mesal one.

Distribution: Guanajuato and Jalisco.

New Record: JALISCO: 16 miles southeast of Lagos de Moreno, 6700 ft., September 4 (1 male).

Epicauta lauta lauta (Horn)

Macrobasis lauta Horn, 1885, p. 108.
Epicauta compressicollis Champion, 1892, p. 427, pl. 19, fig. 26.
Epicauta lauta, Vaurie, 1950, p. 32.

Five specimens were collected at light. They agree perfectly with Werner's (1945) description and other specimens from Arizona.

Distribution: Chihuahua, Coahuila, and Durango.

New Records: CHIHUAHUA: San Pedro River, 49 miles southeast of Chihuahua, 4000 ft., July 20 (3 males, 1 female); Ahumada, July 22 (1 female).

Epicauta linearis (LeConte)

Lytta linearis LeConte, 1858, p. 23.
Epicauta linearis, Vaurie, 1950, p. 37.

A male collected at light in Durango is the second specimen recorded from Mexico. A few specimens have been reported from Texas.

The Mexican specimen agrees closely with the description of this species given by Dillon (1952), which differs in some details from that published by Werner (1945). The fourth antennal segment is no broader than the third, and the antennal calluses each have a distinct fovea.

Distribution: Durango.

New Record: DURANGO: 35 miles south of El Entronque, 5000 ft., July 21 (1 male).

Epicauta pardalis LeConte

Epicauta pardalis LeConte, 1866, p. 157; Champion, 1892, p. 414, pl. 19, fig. 10; Werner, 1945, p. 443; Vaurie, 1950, p. 21, fig. 4.

All specimens were found feeding on *Prosopis glandulosa* (Cavanilles) Bentham & Hooker, at roadside.

Distribution: Chihuahua, Coahuila, Durango, and Sonora.

New Record: CHIHUAHUA: 54 miles south of Sueco, July 22 (7 males, 1 female).

Epicauta polingi Werner

Epicauta polingi Werner, 1944, p. 71; Werner, 1949, p. 75; Vaurie, 1950, p. 33, fig. 10.
Marcrobasis divirsicornis, Champion, 1892, p. 399 (in part).

Specimens from Chihuahua and Durango may represent two different subspecies. The latter are uniformly darker and smaller (10 mm. in length as compared with 12 mm.) than the pair from Chihuahua, have finer, less dense, yellow-gray pubescence, and tan elytra. In the Chihuahua specimens the pubescence is ashy gray and it affects the general color to a much greater extent; the elytra are more of a reddish brown color. The elytral pubescence in the Durango specimens is hardly noticeable macroscopically. There are minor differences in the male genitalia of the Chihuahua and Durango specimens, but I have seen only the one male from the former locality and lack additional comparative material. All specimens were collected at light.

Distribution: Chihuahua, Coahuila, Durango, and Nuevo León.

New Records: CHIHUAHUA: 20 miles south of Juarez, 4600 ft., July 19 (1 male, 1 female). DURANGO: 35 miles south of El Entronque, 5000 ft., July 21 (4 males, 6 females).

Epicauta rufipedes (Dugès)

Cantharis rufipedes Dugès, 1869, p. 163, pl. 2, fig. 4.
Epicauta rufipedes, Dugès, 1889, p. 64; Champion, 1892, p. 407, pl. 19, fig. 2; Vaurie, 1950, p. 17, fig. 2.
Cantharis cinctella Dugès, 1877, p. 59, pl. 2, fig. 3.
Epicauta cinctella Dugès, 1889, p. 64.
Epicauta rufipedes var. *cinctella*, Champion, 1892, p. 407, pl. 19, fig. 3.
Lytta subvittata Haag-Rutenberg, 1880, p. 47 (not Erichson, 1848).
Epicauta vittula Beauregard, 1889, p. ccxii (New name for *L. subvittta* Haag-Rutenberg).

All of the specimens examined have the discal vitta of the elytra present. Nine of them have ferrugineous pubescence. In the rest the pubescence is gray or yellowish gray. There is considerable size variation.

Distribution: Chiapas, Colima, Durango, Guerrero, Jalisco, Michoacán, Morelos, Nayarit, Oaxaca, Puebla, Vera Cruz, and Yucatán.

New Record: GUERRERO: 5 miles north-northeast of Mexcala, 2000 ft., August 31 (26 males, 33 females).

Epicauta tenella (LeConte)

Lytta tenella LeConte, 1858, p. 23.
Epicauta tenella, Vaurie, 1950, p. 33.

A specimen from Durango extends the known range of this species 175

miles southward. In Arizona and New Mexico *E. tenella* is one of the commonest species of *Epicauta* attracted to lights.

Distribution: Chihuahua and Durango.

New Records: CHIHUAHUA: 20 miles south of Juarez, 4600 ft., July 19 (1 female). DURANGO: 35 miles south of El Entronque, 5000 ft., July 21 (1 female).

Epicauta terminata (Dugès)

Cantharis terminata Dugès, 1869, p. 157, pl. 2, fig. 11.
Epicauta terminata, Dugès, 1889, p. 78; Champion, 1892, p. 409, pl. 19, fig. 5.

The pale area of the elytra is fulvous, with pubescence of the same color The series is uniform in color.

Distribution: Guerrero, Jalisco, Puebla, and Vera Cruz.

New Record: GUERRERO: Mexcala, 1350 ft., August 30 (9 males, 7 females).

Epicauta uniforma Werner

Epicauta uniforma Werner, 1944, p. 67.

This species is new for Mexico. The female from Chihuahua, collected on alfalfa, appears to be definitely conspecific with a male of *E. uniforma* from Arizona determined by Werner. The Zacatecas specimen is assigned to this species with some hesistancy. It has a narrower body, ferrugineous, instead of gray, pubescence, and the median impression of the pronotum more distinct than in the Chihuahua and Arizona specimens. Otherwise it appears to be identical.

Distribution: Chihuahua and Zacatecas.

New Records: CHIHUAHUA: Juarez, September 7 (1 female). ZACATECAS: 19 miles south of Sombrerete, 7000 ft., September 5 (1 female).

Eupompha fissiceps LeConte

Eupompha fissiceps LeConte, 1858, p. 21; Dugès, 1889, p. 108 (115); Champion, 1892, p. 393, pl. 18, fig. 13; Vaurie, 1950, p. 60.

A single specimen was found running along the ground in a depressed area on the desert.

Distribution: Chihuahua, Coahuila, and Durango.

New Record: CHIHUAHUA: 2 miles north of Sueco, July 22 (1 female).

Gnathium francilloni Kirby

Gnathium francilloni Kirby, 1818, p. 426, pl. 22, fig. 6; Champion, 1892, p. 381.

Champion reported a specimen of this species from Durango City (Victoria de Durango), Durango. In the United States it ranges along the southern border and Gulf states, from Arizona to Georgia.

The specimen on which the present record is based differs in color from Champion's description. The head and legs are piceous, the thorax dark brown, the elytra light rufous, the galeae, pronotum, and abdomen yellow. The galeae are nearly twice as long as the pronotum. The setae of the elytra are separated by a distance equal to their length. The specimen appears to approach the intermediate variety mentioned by MacSwain (1952). The shape of the pronotum agrees with the figure which he gave for this species.

Distribution: Durango and Zacatecas.

New Record: ZACATECAS: 19 miles south of Sombrerete, 7000 ft., September 5 (1 female).

Linsleya convexa (LeConte)

Lytta convexa LeConte, 1853, p. 336

This is the first Mexican record of *Linsleya convexa*. Specimens were collected on an unidentified plant or on the ground. The habits of this species are similar to those of the calospastines *Megetra, Cysteodemus,* and *Eupompha* in that the adults spend much of the time running on the ground and seem to visit their host plants only intermittently. *Linsleya sphaericollis* (Say) (not recorded from Mexico) is also an active species, but it remains almost constantly on its host plant.

Distribution: Chihuahua.

New Records: CHIHUAHUA: 7 miles north of Chihuahua, July 22 (3 males, 3 females); 2 miles north of Sueco, July 22 (6 males, 4 females); 54 miles south of Sueco, July 22 (1 female).

Two species of *Linsleya* are now known to occur in Mexico. The other species, *L. suavissima* (Wellman), was recorded by Champion (1892) (as *Cantharis gentilis* Horn) from Canelas, Durango. Vaurie (1950) included this record in her report as *Lytta suavissima*.

Key to the Species of *Linsleya* of Mexico

Elytra dark blue; head and pronotum subglabrous; fore tibiae of male lacking spurs; length: 7-14 mm. ..... *convexa*

Entirely black; head and pronotum densely pubescent; fore tibiae of male each with two spiniform spurs; length: 18-23 mm. ..... *suavissima*

Lytta michoacanae (Champion)

Cantharis michoacanae Champion, 1892, p. 447.

Previously, this species was known only from Michoacán. The present records are the first since the original description and extend the known distribution nearly 100 miles southeastward.

Distribution: Guerrero and Michoacán.

New Records: GUERRERO: Mexcala, 1350 ft., August 20 (1 female); 5 miles north-northeast of Mexcala, 2000 ft., August 31 (1 male, 4 females).

Lytta augusti Haag-Rutenberg

Lytta variabilis var. *Augusti* Haag-Rutenberg, 1880, p. 38 (footnote).

Cantharis subviolacea Champion, 1892, p. 445; Champion, 1893, p. 463, pl. 21, fig. 22.

Champion stated that his *Cantharis subviolacea* is the same as Haag-Rutenberg's *Lytta variabilis* var. *Augusti*. The name *augusti* was validated earlier, however, and has priority.

This species was poorly described by Champion, and his figure of the sixth visible abdominal sternite of the male is highly inaccurate. Two specimens collected together an a "purple flower" in Vera Cruz in 1952 were at first considered as representing a new species, but specimens of *L. augusti* from Champion's Biologia material received later are identical. The male genitalia and sixth visible abdominal sternite are shown in figure 1.

Distribution: Oaxaca, Vera Cruz, and possibly Zacatecas. Champion recorded *C. subviolacea* from Parada. The only town of this name that I have

been able to locate is in Zacatecas, but I have some doubt as to whether this is the right one.

New Records: OAXACA: (British Museum (Natural History)) (1 male, 1 female). VERA CRUZ: El Puerto, 7000 ft., 31 miles southwest of Orizaba, August 1 (1 male, 1 female). "Mexico" (British Museum (Natural History)) (1 male).

Lytta variabilis (Dugès)

Cantharis variabilis Dugès, 1869, p. 111, pl. 1, fig. 11; Dugès, 1889, p. 107; Champion, 1892, p. 447.

A specimen was collected in Zacatecas. It has a light orange pronotum with two black spots, as described for the typical form by Dugès. The species is much more widely distributed than Champion's work would indicate.

Distribution: Guanajuato, San Luis Potosí, and Zacatecas.

New Record: ZACATECAS: 5 miles south of Sombrerete, 7000 ft., September 5 (1 male).

Megetra vittata (LeConte)

Cysteodemus vittatus LeConte, 1853, p. 330.
Megetra vittata, Champion, 1892, p. 370; Vaurie, 1950, p. 65, fig. 21.

This species was found crawling on the sand or feeding on leaves of *Boerhaavia erecta* Linnaeus in relatively less xeric depressed areas or washes on the desert. When handled the beetles emitted unusually large quantities of deep red "blood" from the femoro-tibial joints, as well as a yellow fluid from the mouth opening. The "blood" produced numerous blisters on the hands of the collectors.

Distribution: Chihuahua, Coahuila, and Durango.

New Records: CHIHUAHUA: 2 miles north of Sueco, July 22 (18 males, 5 females); 7 miles north of Chihuahua, July 22 (1 male); 30 miles south of Chihuahua, July 21 (58 males, 21 females).

Meloe laevis Leach

Meloe laevis Leach, 1815, p. 249; pl. 18, fig. 4; Champion, 1891, p. 366, pl. 17, fig. 3; Van Dyke, 1928, p. 445, pl. 19, figs. 19-20; Vaurie, 1950, p. 53, fig. 17.
Meloe cordillerae Chevrolat, 1829-1844, p. 133, pl. 35, fig. 6.
Meloe sublaevis LeConte, 1854, p. 84.
Meloe Tuccia? Peñafiel y Barranco, 1866, p. 227, pl. 3.
Meloe tridentatus Jiménez, 1866, p. 230.
Treidons Barranci, Dugès, 1869, p. 102, pl. 1, figs. 1-2.
Meloe opaca Motschulsky, 1873, p. 48 (not LeConte, 1861).
Treiodous Cordillerae, Dugès, 1889, p. 35.

A male was found crawling along a rock bank of the Rio Metztitlan, Hidalgo, near a low cliff. The immediate area is within the Arid Upper Tropical Zone. The surrounding region is Lower Sonoran. This is the first record of this widespread species from the state of Hidalgo.

The specimen has essentially the same characters as specimens of *M. laevis* from New Mexico and Colorado. The genitalia (Fig. 2) agree with Champion's figure.

Distribution: Chihuahua, Coahuila, Distrito Federal, Durango, Guanajuato, Guerrero, Hidalgo, Jalisco, Mexico, Morelos, Oaxaca, San Luis Potosí, Sonora, Las Tres Marias Islands, Vera Cruz, and Zacatecas.

New Record: HIDALGO: Rio Metztitlan, 4000 ft., 20 miles north of Atotonilco el Grande, July 28 (1 male).

Nemognatha lurida LeConte

Nemognatha lurida LeConte, 1853, p. 345; Champion, 1892, p. 374.
Nemognatha rufa Dugès, 1889, p. 111 (118).
Zonitis lurida, Vaurie, 1950, p. 9.

Among the specimens collected five color varieties are represented, as follows: *a*) fulvous, maxillary and labial palpi, galeae, tibiae, and tarsi black; *b*) same as *a*, but scutellum, thorax, except for pronotum, and basal third of abdomen black; *c*) same as *b*, but entire abdomen black; *d*) same as *c*, but apex of elytra black; *e*) same as *c*, but elytra, except for a small area at humerus, black.

Similar color varieties occur in *N. apicalis* LeConte (not recorded from Mexico), which is closely related to the present species. As indicated by LeConte (1880), the punctures of the pronotum are denser in *N. lurida* than in *N. apicalis*, but the difference in pronotal shape which he gave does not hold. The fore tarsi of the female of *N. lurida* have much longer pubescence than in *N. apicalis*.

Nemognatha apicalis occurs on *Helianthus* and *Cirsium* in the western United States. The Mexican specimens of *N. lurida* cited below were collected on flowers of *Verbesina encelioides* (Cavanilles) Bentham & Hooker.

Distribution: Chihuahua, Coahuila, Durango, and Sonora.

New Record: CHIHUAHUA: 2 miles northeast of Camargo, 4000 ft., July 21 (3 males, 5 females).

Nemognatha zonitoides Dugès

Nemognatha zonitoides Dugès, 1876, p. 47, pl., fig. 1; Dugès, 1889, p. 110 (117); Champion, 1892, p. 379, pl. 17, fig. 15.
Zonitis zonitoides, Vaurie, 1950, p. 7, fig. 1.

The recorded range of *N. zonitoides* extends from Guatemala to Texas, but at least two species are involved. The specimen listed below fits Dugès' original description quite closely.

It has the head and elytra black, with coarse, dense punctures, the prothorax yellow, with the pronotum one and one-tenth times as long as broad, coarsely, but sparsely, punctate, and the rest of the thorax and the abdomen piceous. The galeae are a little more than twice as long as the mandibles. The fore and middle femora and tibiae have yellow suffusions apically; the hind femora and tibiae are almost entirely brownish yellow. The antennae are nearly three times as long as the fore tibia, about three and one-third times as long as the pronotum. The genitalia are shown in figure 3.

The figure of the male genitalia given by MacSwain (1952) for *N. zonitoides* certainly represents a different species than the present specimen. Dillon's (1952) record from Texas undoubtedly is based on a different species also.

Distribution: Coahuila, Colima, Durango, Guanajuato, Guerrero, Michoacán, Nuevo León, Yucatán, and Zacatecas.

New Record: GUERRERO: Mexcala, 1350 ft., August 20 (1 male).

Pleuropompha costata (LeConte)

Lytta costata LeConte, 1854, p. 84.
Pleuropompha costata, Vaurie, 1950, p. 38, fig. 12.

Twelve specimens were taken at light. Four of them have tannish pubescence.

Distribution: Chihuahua and Durango.

New Records: CHIHUAHUA: Ahumada, July 21 (1 male); San Pedro River, 49 miles south of Chihuahua, 4000 ft., July 20 (5 males), September 5 (1 male, 5 females).

Pseudozonitis megalops (Champion), new combination

Zonitis megalops Champion, 1892, p. 386, pl. 17, fig. 6; Vaurie, 1950, p. 10.

Two specimens were collected at light. They were determined as *P. megalops* by W. R. Enns (*in litt.*). Dillon (1952) failed to include this species in his genus *Pseudozonitis*, but it belongs there.

One of the specimens is testaceous, with the antennae, eyes, palpi, apex of mandibles and femora, apical half or two-thirds of tibiae, and tarsi black. The pronotum is marked with a deep red cross, extending to the apical, basal, and lateral margins. The elytra are fuscous, with the lateral and mesal margins and a thin discal vitta testaceous. The head and pronotum are very densely punctate. The hind tibial spurs are broad, spoon-shaped. The eyes are very narrowly separated ventrally by the gula, more broadly separated dorsally. The antennae are very slender. The other specimen is the same, except that the metathorax and abdomen are fuscous.

Distribution: Chihuahua and Durango.

New Record: DURANGO: 35 miles south of El Entronque, 5000 ft., July 21 (2 males).

Pyrota akhurstiana Horn

Pyrota Akhurstiana Horn, 1891, p. 44, pl. 1, fig. 9.
Pyrota akhurstiana, Champion, 1892, p. 434; Vaurie, 1950, p. 48.

This species was fairly common at lights. A female with a deformed wing and elytron was collected on *Prosopis* sp., but it was probably not feeding on this plant. Specimens collected show the same color variation described by Vaurie. The red spot on the pronotum which she mentioned is on the apical (cephalic) margin, not "at the base."

Distribution: Chihuahua and "North Mexico."

New Records: CHIHUAHUA: 20 miles south of Juarez, 4600 ft., July 19 (2 males, 1 female); San Pedro River, 4000 ft., 49 miles south of Chihuahua, July 20 (10 males, 11 females); 7 miles north of Chihuahua, 4600 ft., July 22 (2 males, 1 female); Colonia Dublán, July, 1931, Beck & Call (Brigham Young University) (3 males, 1 female).

Pyrota bilineata Horn

Pyrota bilineata Horn, 1885, p. 115, pl. 5, fig. 22; Champion, 1892, p. 435.

Champion reported this species from northern Sonora. The present specimen has the mesal vitta extending anteriorly only to the basal third of each elytron. It was collected on a flowerhead of *Helianthus petiolaris* Nuttall.

Distribution: Chihuahua and Sonora.

New Record: CHIHUAHUA: 44 miles south of Juarez, July 23, 1931 (1 female).

Pyrota divirgata (Villada & Peñafiel)

Cantharis divirgata Villada & Peñafiel, 1867, p. 14, fig.; Dugès, 1869, p. 164; Dugès, 1889, p. 108.
Lytta clavipalpis Haag-Rutenberg, 1880, p. 50.
Lytta nigrovittata Haag-Rutenberg, 1880, p. 51.
Pyrota divirgata, Champion, 1892, p. 433, pl. 20, fig. 7; Champion, 1893, p. 463, pl. 21, fig. 16.
Pyrota divirgata var. *clavipalpis*, Champion, 1892, p. 433; Champion, 1893, p. 463, pl. 21, fig. 17.

Specimens of this species recorded below are discussed in some detail in another paper (Selander, MS). Those from Mexcala, 1350 ft., were collected on grass and unidentified small flowers at the edge of a corn field. They were distinctly localized in distribution. As with several other species collected at this locality, it was noticed that individuals crawled down the host plants in the evening and apparently spent the night near or on the ground. Early the following morning they began crawling up the vegetation, at which time they were less wary and slower moving than later in the day. Despite their abundance at this locality, only two specimens of *P. divirgata* came to light during the night. The site at Mexcala is in the Arid Upper Tropical Zone.

Distribution: Chiapas, Guerrero, Morelos, Oaxaca, Puebla, and Vera Cruz.

New Records: GUERRERO: Mexcala, 1350 ft., August 20, 30 (23 males, 46 females); 5 miles north of Mexcala, 2000 ft., August 31 (1 male).

Pyrota palpalis Champion

Pyrota palpalis Champion, 1893, p. 462; Vaurie, 1950, p. 50.
Pyrota terminata, Champion, 1892, p. 429, pl. 20, fig. 1.
Pyrota mylabrina, Vaurie, 1950, p. 50, fig. 16 (in part).

Four specimens came to light. All of the specimens examined by Vaurie and reported as *P. mylabrina* actually belong to this species.

Distribution: Chihuahua, Coahuila, Durango, Nuevo León, Sonora, and Zacatecas.

New Record: CHIHUAHUA: San Pedro River, 49 miles south of Chihuahua, September 5 (2 males, 2 females).

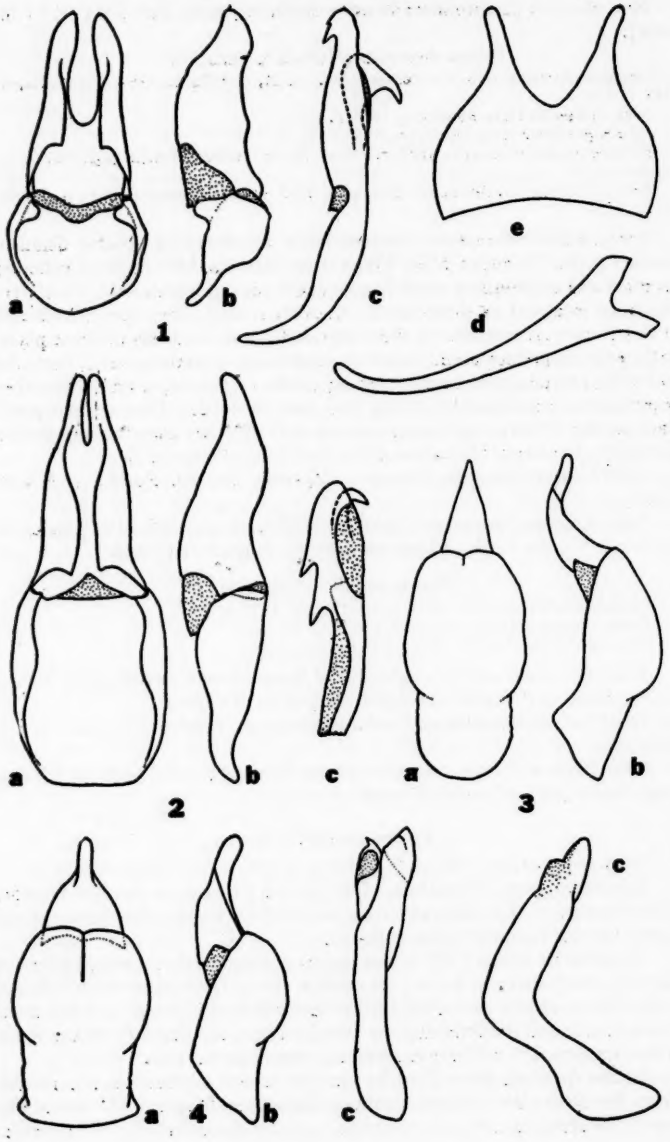
Pyrota punctata Casey

Pyrota punctata Casey, 1891, p. 173; Champion, 1892, p. 430; Vaurie, 1950, p. 51.

Specimens from Chihuahua, Hidalgo, and Oaxaca are the first recorded from these states. The latter two records extend the known distribution of this species several hundred miles southward.

As noted by Dillon (1952), this species is distinguished from all others of similar color pattern in having the median elytral fascia more or less bilobed, with the mesal lobe extending farther basad than the lateral, and the apical fascia lunate and not attaining the apical margin, although the separation in a few specimens that I have examined is extremely narrow.

In one specimen from 20 miles south of Juarez, Chihuahua, and another from San Pedro de Colonias, Coahuila (American Museum of Natural History), the apical lunule is connected narrowly to the lateral lobe of the median


a
b
c
1
d
e
a
b
c
2
a
b
3
a
b
c
4
c

fastia, a condition predicted for this species by Casey in his original description.

The Chihuahua specimens were collected at light. The species is known to feed on *Sphaeralcea* in the United States.

Distribution: Chihuahua, Coahuila, Durango, Hidalgo, and Oaxaca.

New Records: CHIHUAHUA: 20 miles south of Juarez, July 19 (3 females). HIDALGO: Pachuca, 8000 ft., July 13, 1937, K. L. Maehler Collection (R. B. Selander) (1 female). OAXACA: Valerio Trujano, 4500 ft., K. L. Maehler Collection (R. B. Selander) (1 female).

Tetraonyx fulvus LeConte

Tetraonyx fulva LeConte, 1853, p. 344.
Tetraonyx rufus Dugès, 1869, p. 105, pl. 1, fig. 7.
Tetraonyx fulvus, Dugès, 1889, p. 112; Champion, 1892, p. 392; Vaurie, 1950, p. 45, fig. 15.

Adults were collected on *Sphaeralcea angustifolia* (Cavanilles) Don; they are apparently pollen feeders. Many of the specimens have first instar larvae of *Tetraonyx* attached to their pubescence.

Among the Meloidae, *Tetraonyx* is most closely related to the nemognathines. The genus has generally been placed in the meloid subfamily Lyttinae, but it seems best to recognize it as representing a tribe of Nemognathinae.

Distribution: Chihuahua, Coahuila, Durango, and Guanajuato.

New records: CHIHUAHUA: 2 miles northeast of Camargo, 4000 ft., July 21 (22 males, 11 females); 5 miles north of Delicias, 4000 ft., July 21 (58 males, 75 females).

Zonitis dugesi, new name

Gnathium atrum Dugès, 1889, p. 113 (120).
Nemognatha atra, Champion, 1892, p. 380.

This species belongs in the tribe Zonitini as defined by MacSwain (1952) and in the genus *Zonitis*. It then becomes a secondary junior homonym of *Zonitis atra* Dugès (1881, p. 146) (=*Z. ploribunda* Wellman, 1910). It was treated as a *Zonitis* in Blackwelder's catalogue (1945) and in Denier's (1935), but its status as a junior homonym was not noted in either.

Dugès described this species from Tupátaro, Guanajuato. A specimen collected in 1952 extends the known range into Guerrero. It is black, with the mandibles and last abdominal segment yellow brown. The head, pronotum, and elytra are coarsely and densely punctate and rugose. The hind tibial spurs are subequally spoon-shaped. The pronotum is one and one-tenth times as broad as long, sinuate behind the middle, rounded and gradu-

EXPLANATION OF PLATE

Fig. 1. *Lytta augusti* Haag-Rutenberg, ♂ : a. tegmen, ventral aspect; b. tegmen, lateral aspect; c. median lobe, lateral aspect; d. outline of ninth abdominal sternite; e. sixth visible abdominal sternite.

Fig. 2. *Meloe laevis* Leach, ♂ : a. tegmen, ventral aspect; b. tegmen, lateral aspect; c. apex of median lobe, lateral aspect.

Fig. 3. *Nemognatha zonitoides* Dugès, ♂ : a. tegmen, dorsal aspect; b. tegmen, lateral aspect; c. median lobe, lateral aspect.

Fig. 4. *Zonitis dugesi* Selander, ♂ : a. tegmen, dorsal aspect; b. tegmen, lateral aspect; c. median lobe, lateral aspect.

ally convergent before. The entire surface is clothed with black, recumbent pubescence. The long, filiform antennae are not perceptibly broader distally, but slightly so by actual measurement. The genitalia are as in figure 4.

Dillon's (1952) record of *N. atra* (Dugès) from Texas is probably based on a misdetermination. He described the head and pronotum as "sparsely, finely" punctate. Dugès stated that the head is coarsely and densely punctate.

Distribution: Guanajuato and Guerrero.

New Record: GUERRERO: Mexcala, 1350 ft., August 30 (1 male).

Zonitis punctipennis (LeConte)

Nemognatha punctipennis LeConte, 1880, p. 214.

A female specimen from Durango was determined by W. R. Enns (*in litt.*). I had previously placed it as *Z. tarasca* (Dugès). *Zonitis punctipennis* has not been reported from Mexico before. The specimen is testaceous, with the antennae, tibiae, tarsi, apex of femora, and elytra brownish black. The extreme borders of the elytra are pale brown. The length is 9 mm.

Distribution: Durango.

New Record: DURANGO: 10 miles north of El Entronque, September 5 (1 female).

LITERATURE CITED

Beauregard, H. 1889. [Notes on Meloidae.] Bull. Soc. Ent. France, :ccxii-ccxiii.

Blackwelder, R. E. 1945. Checklist of the coleopterous insects of Mexico, Central America, the West Indies, and South America. Part 3. U. S. Nat. Mus., Bull. 185:i-iv, 343-550.

Casey, T. L. 1891. Coleopterological notices. III. Ann. New York Acad. Sci., 6:9-214.

Champion, G. C. 1891-1893. Biologia Centrali-Americana. Coleoptera. Family Meloidae, 4(2):364-368 (1891); 369-448 (1892); 462-464 (1893), pls. 17-21.

Chevrolat, A. 1829-1844. *In* Guérin-Meneville, F. E., Iconographie du regne animal, 3:133, pl. 35, fig. 6.

Denier, P. C. L. 1935. Coleopterorum Americanorum familiae Meloidarum. Enumeratio synonymica. Rev. Soc. Ent. Argentina, 7:139-176.

Dillon, L. S. 1952. The Meloidae (Coleoptera) of Texas. Amer. Midland Nat., 48:330-420, 3 pls.

Dugès, E. 1869-1881. Descripcion de algunos Meloideos indigenas. La Naturaleza, 1:100-113, 125-128, 157-168, pls. 1-2 (1869); 4:57-67, pl. 2 (1877); 5:140-48, pl. 4 (1881).

1876. Estudios sobre algunos insectos indigenas. Descripcion de una nueva especie de la familia de los Meloideos, Nemognatha zonitoides. La Naturaleza, 3:47-48, pl., fig. 1.

1889. Sinopsis de la Meloideos de la republica Mexicana. An. Mus. Michoacano, 2:34-40, 49-114 (49-128).

Haag-Rutenberg 1880. Beiträge zur Kenntniss der Canthariden. Deutsche Ent. Zeitschr., 24:17-90.

Horn, G. H. 1883. Miscellaneous notes and short studies of North American Coleoptera. Trans. Amer. Ent. Soc., 10:269-312, pl. 9.

1885. Studies among the Meloidae. Trans. Amer. Ent. Soc., 12:107-116, pl. 15.

1891. New species and miscellaneous notes. Trans. Amer. Ent. Soc., 18:32-47, pl. 1.

Jiménez, L. M. 1866. Dictámen de la comision de ciencias auxiliares sobre los insectos presentados á la sociedad por el Sr. Barranco. Gaceta Méd. Mexico, 2:227-230.

Kirby, W. 1818. A century of insects, including new genera described from his cabinet. Trans. Linn. Soc. London, 12:375-454, pl. 22.

Leach, W. E. 1815. Further observations on the genus Meloe, with descriptions of six exotic species. Trans. Linn. Soc. London, 11:242-251, pl. 18.

LeConte, J. L. 1851. Descriptions of new species of Coleoptera, from California. Ann. Lyc. Nat. Hist. New York, 5:125-216.

1853. Synopsis of the Meloides of the United States. Proc. Acad. Nat. Sci. Phila., 6:328-350.

1854. Notice of some coleopterous insects, from the collections of the Mexican Boundary Commission. Proc. Acad. Nat. Sci. Phila., 7:79-85.

1854. Descriptions of new Coleoptera collected by Thos. H. Webb, M.D., in the years 1850-51 and 52, while Secretary to the U.S. and Mexican Boundary Commission. Proc. Acad. Nat. Sci. Phila., 7:220-225.

1858. Catalogue of Coleoptera of the regions adjacent to the boundary line between the United States and Mexico. Jour. Acad. Nat. Sci. Phila., (2)4:9-42, pl. 4.

1863 & 1866. New species of North American Coleoptera, Part I. Smiths. Misc. Colls., 6:1-86 (1863); 87-177 (1866).

1880. Short studies of North American Coleoptera. Trans. Amer. Ent. Soc., 8:163-218.

MacSwain, J. W. 1952. A synopsis of the genus Gnathium, with description of new species (Coleoptera, Meloidae). Wasmann Jour. Biol., 10:205-224, 2 pls.

Maydell, G. G. 1934. New species of North American Meloidae (Coleoptera). Trans. Amer. Ent. Soc., 60:327-336.

Motschulsky, T. V. von 1873. Enumération des nouvelles espèces de Coléoptères rapportés de ses voyages. Bull. Soc. Imp. Moscou, 45(2):23-53.

Peñafiel y Barranco, A. 1866. Estudio sobre dos especie de cantaridas Mexicanas. Gaceta Méd. Mexico, 2:225-227, pls. 1 & 3.

Van Dyke, E. C. 1928. A reclassification of the genera of North American Meloidae (Coleoptera). . . . Univ. Calif. Publ. Ent., 4:395-474, pls. 15-19.

Vaurie, P. 1950. The blister beetles of north central Mexico (Coleoptera, Meloidae). Amer. Mus. Novit., No. 1477:1-68, 21 figs.

Villada, [?], and [A.] Peñafiel [y Barranco] 1867. *In* Herrera, A., and G. Mendoza, Apuntes para la monografia de los insectos vesicantes indigenas (continua). Gaceta Méd. Mexico, 3:13-15, pl.

Werner, F. G. 1944. Some North American species of *Epicauta* (Coleop., Meloidae). Psyche, 50:65-73.

1945. A revision of the genus Epicauta in America north of Mexico. Bull. Mus. Comp. Zool., 95:421-517, 7 pls.

1949. Epicauta divirsicornis and its allies in the Neotropical Region. Psyche, 56:74-80, pl. 5.

BIOLOGY OF THE COMMON RED SPIDER [1,2,3]

by

A. J. WILLIAMS

The common red spider is one of the most troublesome pests of many field and greenhouse crops. In Arkansas it is particularly important as a pest of cotton. Since the advent of DDT and other organic insecticides, the frequency of outbreaks has been multiplied many times. In view of the increased importance of the red spider a careful rechecking of its biology was undertaken to determine if some weakness in its life cycle had been overlooked in past studies and to bring biological information up to date. Changes in taxonomy

[1] Research paper no. 1119, Jour. Series, Univ. of Ark. Published with the permission of the Director of the Experiment Station.

[2] *Tetranychus bimaculatus* Harvey: Order Acarina, Family Tetranychidae.

[3] This paper is based on a master's thesis in entomology. The writer wishes to acknowledge advice and assistance throughout the course of this study from Professors Dwight Isely and Charles Lincoln.

and possible confusion in identification in earlier biological studies was a further reason for undertaking the work.

The biological study reported herein was conducted in the greenhouse of the Department of Entomology of the University of Arkansas between January and May, 1951.

Rearing Technique

In life history studies small potted plants were used. After trying several species, cotton and ageratum were selected because they are common hosts and are easily grown in the greenhouse. A number of types of cages were tried but none was entirely successful in confining the mites or not injuring the leaves. In the end, mites under observation were confined on isolated leaves by a ring of petroleum jelly around the leaf stem. Transfers of stages were made with a small camel's hair brush.

In determining the incubation period, from one to five adult females were placed on an isolated leaf and after 24 hours were removed. During this period, 8 to 50 eggs were deposited, depending on the number of females. The number and frequency of molts were obtained by observing newly hatched larvae placed on an isolated leaf.

Records on total oviposition by individual mites and longevity were secured by isolating females on the day of maturity. The number of eggs deposited each day was recorded. When the eggs on a leaf became too numerous to count easily, the female was transferred to a new leaf and the record continued.

Life History

In life history studies, the terminology used by McGregor (4) was followed. The active immature stages were designated as larvae, protonymph and deutonymph.

The developmental period of the male and female mites was practically the same. As a rule, both sexes passed through three immature stages. However, two of the nine males reared passed through only two instars; the others passed through three. In previous publications only two immature stages of the male have been recorded. Each instar is divided into two distinct periods, an active feeding period and a quiescent period which precedes each molt. The length of these two periods is about equal in each instar.

The time required for the larval period of 24 individuals reared at temperatures ranging from 67° F. to 79° F. varied from 2 to 4 days. The average time required was 2.4 days. The protonymphal period of 24 primary nymphs reared at average daily temperatures from 68°F. to 80°F. varied from 1 to 5 days. The average was 1.9 days. The duration of the deutonymphal period varied from 1 to 3 days at daily mean temperatures ranging from 70° F. to 78° F. The average for 22 individuals was 2.3 days.

Twenty-two females required 6.5 days for development from hatching to maturity, or after passing the third molt. The range was from 3 to 8 days. During this period the mean temperature was from 72° F. to 79° F. The time required for 9 males varied from 5 to 9 days with a mean of 6.8 days. Temperature ranged from 65° F. to 83° F. with an average of 76° F..

Oviposition and Longevity

In these studies the maximum number of eggs deposited by a single female was 212. This indicated a much greater rate of reproduction than previously recorded. The average for 7 females kept throughout the oviposition period was 122. The largest number of eggs deposited by a single female previously reported (1) was 110 with an average for the 10 largest broods of 68. Worsham (2) reported a maximum of 94 eggs for a brood with an average of 80. Ewing (3) recorded 63 as the maximum and 40.7 as an average for 3 females completing natural life.

Daily oviposition in these studies ranged from 1 to 16 with an average of 5.4. It was also observed that the peak of oviposition is not reached until the third or fourth day. Daily oviposition remains high, after the peak is reached, for 7 or 8 days and then begins to decline. McGregor and McDonough (1) recorded 19 as the maximum number of eggs deposited by a single female in a day, and 5.9 as the average. Ewing (3) recorded one or none as the minimum and 9 as the maximum. He obtained 2.2 as the average number of eggs laid in a day.

The maximum number of oviposition days recorded by McGregor and McDonough (1) was 36, and the average was 14. Ewing (3) obtained 29 days maximum and 17.3 as the average. In the present studies the duration of the oviposition period for 7 red spiders, reared at a temperature ranging from 65°F. to 83°F. varied from 10 to 36 days with an average of 22.4 days.

Summary

The common red spider passes through 5 stages during the course of its development from egg to egg, which may be completed in as short a period as 9 days at a temperature of about 80°F. This allows 3 days for incubation, 5 days for larval and nymphal stages, and 1 day for the preoviposition period.

It was found in these studies that most of the males pass through 3 instars rather than 2 as was reported in earlier work. The time required for each instar in both male and female is about the same. The average number of eggs deposited is 122, and a maximum of 212 indicates a much greater fecundity than previously recognized.

REFERENCES CITED

(1) McGregor, E. A., and F. L. McDonough, 1917. The red spider on cotton. U. S. Dept. Agr., Bul. 416., 72p.
(2) Worsham, E. L., 1910. The cotton red spider, Georgia Expt. Sta. Bul. 92:135-141.
(3) Ewing, H. E., 1914. The common red spider or spider mite. Oregon Agr. Expt. Sta. Bul. 121, 95p.
(4) McGregor, E. A., 1912. The red spider on cotton. U. S. Dept. Agr., Bur. Ent. Cir. 1500., 13p.

NEOTROPICAL MIRIDAE, LXXIII: A NEW GENUS AND FOUR NEW SPECIES OF BRYOCORINI (HEMIPTERA).

by

JOSÉ C. M. CARVALHO*
Museu Nacional, Rio de Janeiro, Brazil.

In studying the collection of Miridae in the U.S. National Museum the author has found three new species frequently taken on ornamental plants imported to the United States. These are described here.

A new genus and species taken by the author along the Itacoai River near its confluence with the Javari River (upper Amazonas), also is being included.

The author wishes to acknowledge the assistance of Dr. Reece I. Sailer, from the Bureau of Entomology and Plant Quarantine, who provided laboratory facilities in the U.S. National Museum for the work.

Paraneella n.gen.

Characterized by the structure and length of first antennal segment, shape and pubescence of posterior femora and the very small and flat scutellum.

Head wider than long, eyes prominent, frons rounded, protruding between the antennae, vertex smooth, clypeus long, its basal suture level with inferior margin of eye. Rostrum reaching the posterior coxae, the first two joints long, third and fourth very short, subequal.

Antennae slender, first segment distinctly narrowed on basal half, the apical half thicker than second segment which is linear, as long as the first segment, pilose; third and fourth segments very slender, subequal and pilose.

Pronotum thick and coasely punctate, distinctly narrowed anteriorly, collar wide, calli smooth, reaching the lateral margins, posterior margin straight over scutellum, then obliquely truncate, posterior angles prominent, lateral margins rounded and strongly inclined, constricted behind and in front of calli; scutellum very small and flat, one third length of claval commissure.

Hemelytra very finely rugose and punctate, with sparse and short pubescence, the veins distinct, embolium thick, cuneal fracture almost obsolete, apical angle of areola broadly rounded.

Legs with tibiae relatively thickened, femora beset with long, fine and erect setae, posterior pair curved inwards and noticeably incrassate towards the base, tarsi and pseudarolia of the bryocorine type.

Type of genus: Paraneella amazonica n.sp.

This genus is nearest to *Neella* Reuter, differing however in the basal narrowed portion of first antennal segment which is also as long as the second segment, in the shape and pubescence of posterior femora and in the small and flat scutellum.

---

*John Simon Guggenheim Memorial Fellow 1953. Additional assistance was also granted by the Brazilian National Research Council.

Paraneella amazonica n.sp.
(Fig. 1)

Characterized by its color and size.

Female: Length 4.1 mm., width 1.7 mm. *Head:* Length 0.3 mm., width 0.8 mm., vertex 0.46 mm. *Antennae:* Segment I, length 0.6 mm.; II, 0.7 mm.; III, 0.3 mm.; IV, 0.3, mm. *Pronotum:* Length 0.8 mm., width at base 1.2 mm.

Color: Lutescent with a longitudinal median black fascia; first and second antennal segments black (except base of first joint), third and fourth segments yellowish lutescent; head brownish lutescent, eyes and apex of clypeus black to fuscous; pronotum orange lutescent with a median longitudinal black vitta beginning between the calli and widening gradually towards the base of scutellum which is black with lutescent sides; clavus orange lutescent on basal half or so, the apical half black, corium yellowish lutescent, black on or near corial commissure following black portion of clavus, extreme outer margin of embolium, cuneus, inner margin and apex of the latter, membrane, fuscous to black; tibiae and apex of femora (most noticeably towards the posterior pair), third and fourth segments of tarsi, apex of rostrum, fuscous to black.

Morphological characters as given for genus.

Male: Unknown.

Holotype: Female, Rio Itacoai, Estado do Amazonas, Brasil, July 1950 (J.C.M. Carvalho) in the collection of the author.

This species shows some similarities with *Neella decarloi* Carvalho, but is, however, easily differentiated by the generic characters and different color markings.

Neoleucon Distant, 1884

Biol. Cent. Amer.; Rhynch. Het. I:299; haplotype *Neoleucon horribilis* Distant, 1844, I. c. Panama.

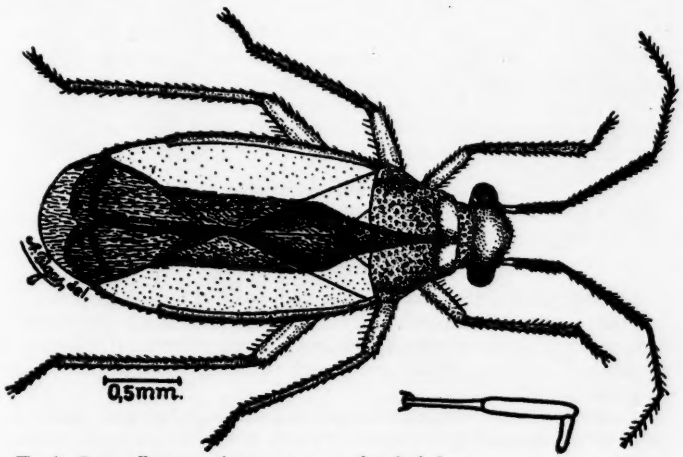


Fig. 1—*Paraneella amazonica* n. gen., n. sp., female, holotype.

Neoleucon rubrotylus n.sp.
(Fig. 2A)

Characterized by the color of the clypeus, antennae, calli, embolium, tibiae and abdomen and also by the structure of the male genitalia.

Male: Length 4.4 mm., width 1.7 mm. *Head:* Length 0.2 mm., width 1.0 mm., vertex 0.61 mm. *Antennae:* Segment I, length 0.4 mm.; II, 0.8 mm.; III, 0.5 mm.; IV, 0.7 mm. *Pronotum:* Length 0.8 mm., width at base 1.3 mm. *Rostrum:* Length 1.6 mm.

Color: Head and pronotum light yellow to lutescent overlaid with a longitudinal median luteous to reddish fascia, with two spots on posterior half of disc touching the posterolateral angles of pronotum, mesoscutum and scutellum, black; hemelytra cinereous to lutescent overlaid with luteous at middle of corium (roundish near corial commissure), internal margin, apex and spot near fracture of cuneus, veins of membrane, black, the latter infumate; antennae black, extreme base of first joint, submedian ring on second joint, basal half of third, base and apex of fourth joint, whitish; clypeus red at base black apically; jugum, gena and portion below eye, black; upper portion of xyphus, sides of pronotum, pleural portion and abdomen, black; legs whitish yellow, profemur (except basal third), mesofemur (except basal half) and metafemur (except basal two thirds), black; base and subapical band on tibiae, black.

Body very short and sparingly pilose, pronotum with a deep puncture between the calli; rostrum reaching the fourth abdominal segment; antennae slender, second segment very slightly incrassate towards the apex.

Genitalia: Pygophore (fig. 2A) as in illustration, the left clasper branched, the right clasper very long and slender.

Female: Similar to male in color and dimensions.

Holotype: Female, Fortin, V.C., Mexico, intercepted at Laredo, Texas, Oct. 7, 1952, on *Philodendron* plants, in the collection of the U. S. National Museum, Cat. No. 61989. *Allotype:* Male, Orizaba, Mexico (intercepted at Laredo, Texas). *Paratypes:* One female and one male, same data as holotype, in the collection of the USNM and of the author.

This species differs from *Neoleucon horribilis* Distant in the color of the clypeus, antennae, calli, embolium, tibiae and abdomen, as well as in the structure of the male genitalia.

Tenthecoris Scott, 1886

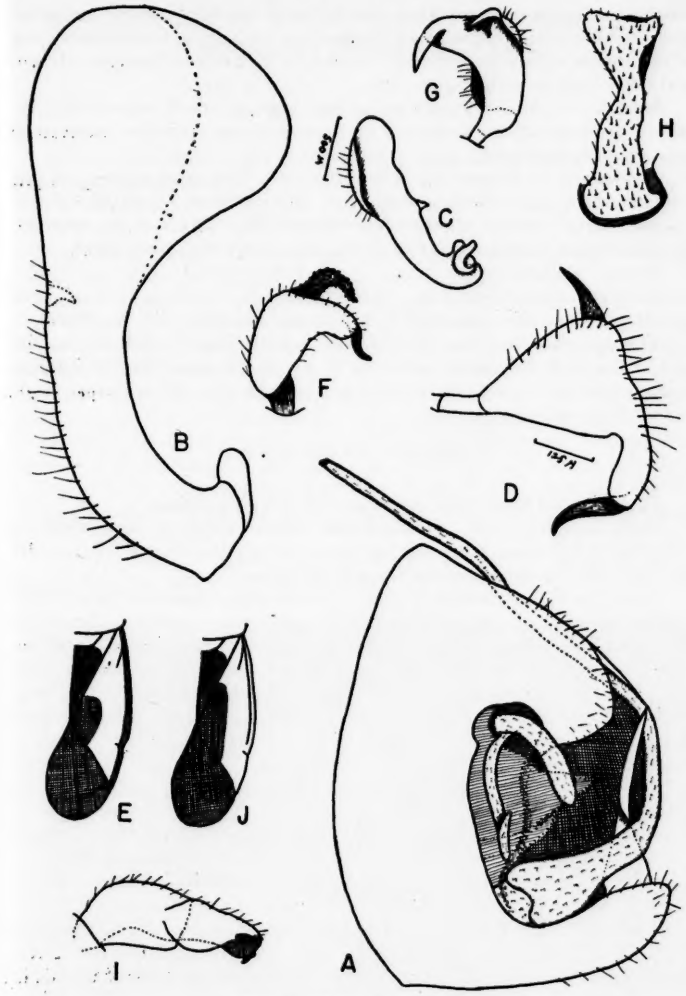
Ent. Mo. Mag., 23:65; *haplotype*: *Tenthecoris bicolor* Scott, l. c., Antilles.

Tenthecoris costaricensis n.sp.
(Figs. 2B-E)

Characterized by the color of vertex and structure of male genitalia.

Male: Length 4.8 mm., width 1.4 mm. *Head:* Length 0.3 mm., width 1.1 mm., vertex 0.66 mm. *Antennae:* Segment I, length 0.6 mm.; II, 0.8 mm.; III, 0.5 mm.; IV, 0.5 mm. *Pronotum:* Length 0.8 mm., width at base 1.7 mm. *Rostrum:* Length 1.5 mm.

Color: Reddish ochraceous with dark bluish central dark area; head, collar, calli and mesoscutum, golden yellow; vertex with a bluish black transverse fascia; eyes and antennae black; pronotum and hemielytra reddish ochra-



EXPLANATION OF FIGURES

Fig. 2—A-Pygophore of *Neoleucon rubrotylus* n. sp., lateral left view; B- Right clasper of *Tenthecoris costaricensis* n. sp., dorsal view; V-Idem, ventral view; D- Idem, left clasper; E- Idem, dark markings of the hemelytra; F- Left clasper of *Tenthecoris ecuadorensis* n. sp., dorsal view; G- Idem, ventral view; H-Idem, right clasper, dorsal view; I- Idem, lateral right view; J- Idem, hemelytra to show dark markings.

ceous to orange, scutellum, clavus (except basal one fifth), fascia on corium along commissure, extreme base of cuneus and membrane, bluish black; vein of membrane with a luteous tinge; underside yellow to ochraceous, clypeus and tibiae black to dark fuscous.

Rostrum reaching posterior coxae, first segment much stouter than the others, reaching subapical portion of anterior coxae; scutellum excavate at base, vein of membrane minutely pubescent.

Genitalia: Left clasper (fig. 2D) as shown in illustration with apical prolongations, the right one seen from above starting from a fingerlike arm of clasper, dorsal surface pilose. Right clasper (fig. 2B,C) large, spatulate apically, with a toothlike tubercle on the left margin seen from above.

Female: Unknown.

Holotype: Male, Costa Rica, intercepted at San Francisco, California (on orchids), in the collection of the U.S. National Museum, Cat. No. 61990.

This species is very near *Tenthecoris confusus* Hsiao and Sailer, but differs in the black transverse fascia on vertex, in the more broadly spatulate right clasper and in the much longer and broader arm of left clasper (right branch in dorsal view).

Tenthecoris ecuadorensis n.sp.
(Figs. 2F-J)

Characterized by its color and structure of male genitalia.

Male: Length 3.6 mm., width 1.9 mm. *Head:* Length 0.3 mm., width 1.1 mm., vertex 0.66 mm. *Antennae:* Segment I, length 0.6 mm.; II, 0.7 mm.; III, 0.2 mm.; IV, 0.1 mm. *Rostrum:* Length 1.7 mm.

Color: Sordid ochraceous to greenish ochraceous; middle of head, collar, portion behind calli, posterior margin of pronotum, scutellum, clavus (except basal fifth), roundish spot on corium bordering commissure, embolium, membrane (except extreme apex), outer margin and extreme base of cuneus, eyes, antennae, clypeus and tibiae, brown to fuscous; genae and first coxae with traces of reddish at base; pleural portion, coxae, femora (except fuscous apices) and tarsi, pale ochraceous; mesoscutum and corium lighter than remainder of upper surface.

Body weakly sclerotized, with dense, short, erect pile, embolium incrassate and narrow.

Genitalia: Left clasper (fig. 2F, G) branched apically into two arms, the left one seen from above with a few minute tubercles as illustrated. Right clasper (fig. 2H,I) as illustrated, the upper surface covered with short setae.

Female: Similar to male in color and dimensions.

Holotype: Male, Ecuador, V.12.47, on *Cattleya* leaf, in the collection of the U.S. National Museum, Cat. No. 61991. *Allotype:* Female. *Paratypes:* One female and four nymphs, same data as holotype, in the collections of the USNM and the author.

This species differs from all others of the genus in the color and the structure of the male genitalia.

A NEW SPECIES OF ERYTHRONEURA (Homoptera, Cicadellidae) FROM KANSAS[1]

R. N. SINHA AND R. H. BEAMER
University of Kansas, Lawrence

Below is described a new species of *Erythroneura* of the Obliqua group collected in Kansas in 1926.

Erythroneura sabita n.sp.

Resembling *Erythroneura unicuspidis* Beamer, but aedeagus without lateral teeth; posterior point of the style much longer.

General ground color semihyaline to whitish, marked with orange. Vertex with inverted orange V; one stripe on each side from the middle of the inverted V, branched close to eye, continued across pronotum as two nearly parallel vittae. Scutellum with basal angles yellow bordered on inner margin with dark lines; tip deeper orange. Elytra with usual three pairs of oblique vittae not continuous. Venter stramineous slightly tinged with pink.

Genitalia: Style with medium-sized foot; heel prominent; base slightly swollen to almost straight; anterior point short; posterior point nearly half as long as base, slender and sharp with converging sides. Aedeagus slender without processes; blunt lateral teeth along the short shaft, ejaculatory duct opens at nearly pointed tip.

Holotype, male; allotype, female; paratypes, three males, Douglas County, Kansas, May 19, 1926, Paul B. Lawson.

Erythroneura sabita n. sp.
Left: Dorsal view of the aedeagus and styles.
Right: Shaft of the aedeagus (magnified).

[1]Contribution No. 849, Department of Entomology, University of Kansas.

A TAXONOMIC STUDY OF ADULT CHICKEN LICE FOUND IN THE UNITED STATES [1,2]

H. E. FAIRCHILD[3] AND PAUL A. DAHM[4]
Kansas State College, Manhattan

This paper presents a key to the seven species of chicken lice known to occur in the United States. According to Benbrook (1945) chickens in the United States may be host to one or more of the following species of Mallophaga: the chicken head louse, *Cuclotogaster heterographus* (Nitz.); the chicken body louse, *Eomenacanthus stramineus* (Nitz.); the fluff louse, *Gonicotes hologaster* Nitz.; the brown chicken louse, *Goniodes dissimilis* Nitz.; the large chicken louse, *Goniodes gigas* (Tasch.); the wing louse, *Lipeurus caponis* (L.); and the shaft louse, *Menopon gallinae* (L.). Bishopp and Wood (1939) have also indicated that chickens in the United States may be host to any of the preceding seven species of Mallophaga. Of these the brown chicken louse is most limited in its geographical distribution.

Slide-mounted specimens of both sexes of each of the species of the chicken lice were studied for preparation of the key. The specimens of the chicken body louse, fluff louse, and shaft louse were collected locally, and the identification of these species was verified by C.F.W. Muesebeck, Division of Insect Identification, Bureau of Entomology and Plant Quarantine. Mr. Muesebeck also kindly loaned slide-mounted specimens of the other four species for this study.

The characters used to distinguished the Menoponidae from the Philopteridae were according to Ewing (1929). In all other aspects, the key is original. Three plates were prepared to illustrate the key. Figures 5a and 5b are from original line drawings of *Goniodes dissimilis* Nitz. The works of Herrick (1915) and Whitehead (1942) were of extreme value in illustrating the key.

Insofar as the authors know, the practical key which follows is the first to include all seven species of chicken lice found in the United States.

KEY TO ADULTS OF THE MALLOPHAGA KNOWN TO OCCUR ON CHICKENS IN THE UNITED STATES

1a. Maxillary palpi present; antennae 4-segmented, enlarged apically, and when in repose largely concealed in the fossae ..... Sub-order Amblycera; Family Menoponidae 2

b. Maxillary palpi wanting; antennae 5-segmented, usually filiform, and always exposed ..... Sub-order Ischnocera; Family Philopteridae 3

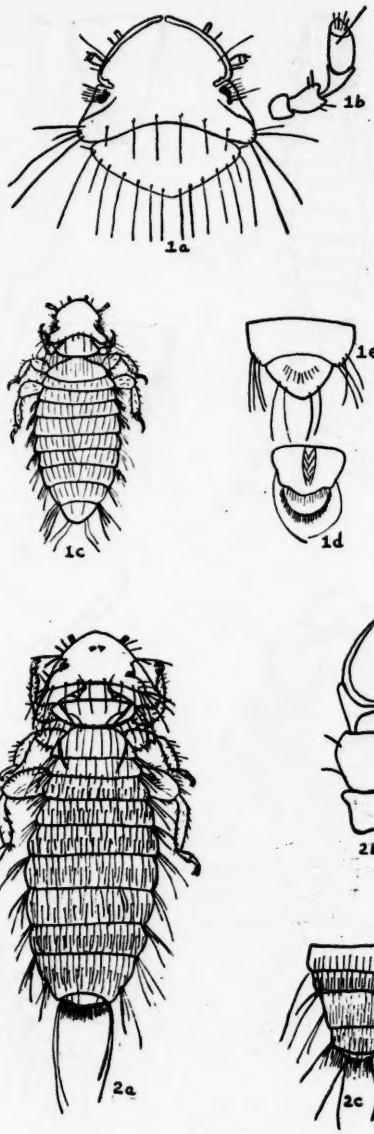
---

[1]Contribution No. 614, Department of Entomology, Kansas State College. A portion of a dissertation presented as partial fulfillment of the requirements for the degree Doctor of Philosophy in Entomology by the senior author at Kansas State College, Manhattan.

[2]The authors gratefully acknowledge the constructive criticisms of this key by Dr. Howard E. Evans, Department of Entomology, Cornell University, and Mr. L. J. Bottimer, U.S. Department of Agriculture, Kerrville, Texas.

[3] Present address: Grasselli Chemicals Department, E. I. du Pont de Nemours & Co., Experimental Station, Wilmington, Delaware.

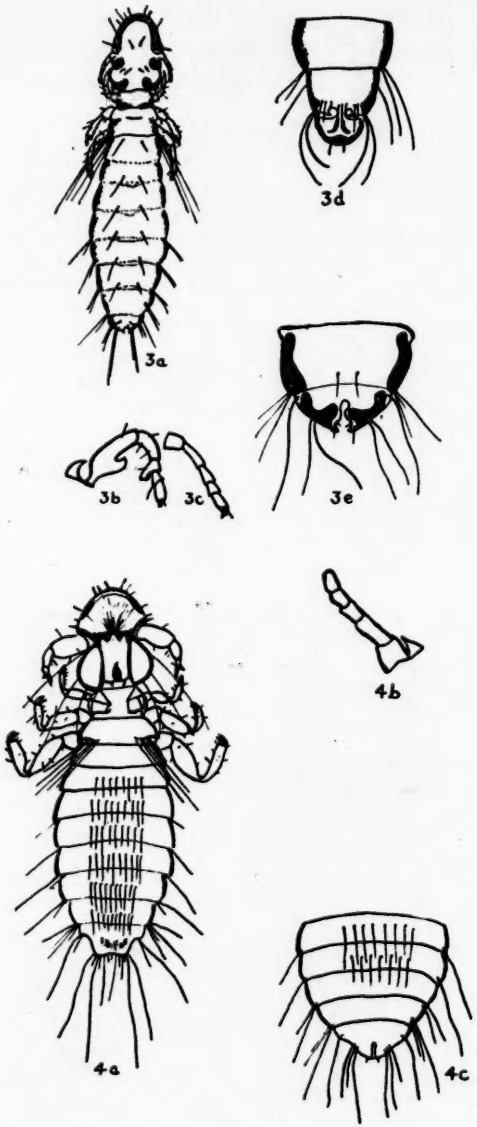
[4] Present address: Dept. of Zoology & Entomology, Iowa State College, Ames, Iowa.



EXPLANATION OF PLATE I

Fig 1. *Menopon gallinae* (L.). a. head and prothorax; b. antenna; c. male; d. end of abdomen of female; e. end of abdomen of male. (After Herrick.)

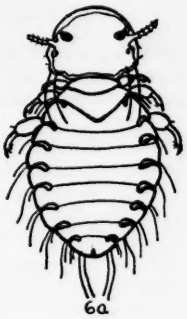
Fig. 2. *Eomenacanthus stramineus* (Nitz.). a. female; b. antenna; c. end of abdomen of male. (After Herrick.)

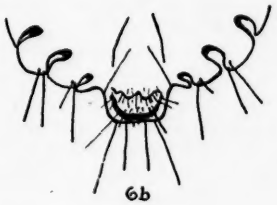


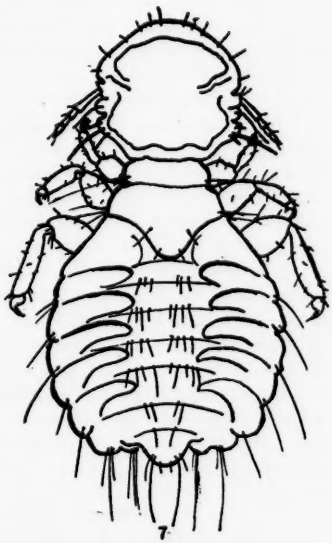
EXPLANATION OF PLATE II

Fig. 3. *Lipeurus caponis* (L.). a. female; b. antenna of male; c. antenna of female; d. posterior end of abdomen of male; e. posterior end of abdomen of female. (3a. After Whitehead; 3b-e. After Herrick.)

Fig. 4. *Cuclotogaster heterographus* (Nitz.). a. male; b. antenna of female; c. posterior end of abdomen of female. (After Herrick.)







EXPLANATION OF PLATE III

Fig. 5. *Goniodes dissimilis* Nitz. a. female; b. head of male. (Original.)

Fig. 6. *Goniocotes hologaster* Nitz. a. female; b. posterior end of abdomen of male. (After Herrick.)

Fig. 7. Male of *Goniodes gigas* (Tasch.). (After Herrick.)

2a. Abdominal segments each with a single transverse row of hairs on dorsum (Figs. 1a-e); body oval, pale yellow; length 1.5-1.9 mm.; commonly found along the shafts of the feathers of chickens ..... *Menopon gallinae* (L.). Shaft Louse.

b. Abdominal segments each with a double transverse row of hairs on dorsum, cephalic row of hairs not so clearly defined (Figs. 2a-c); body elongate-oval, darker yellow; length 2.4-3.1 mm.; commonly found running over the skin in less feathered spots, not on the feathers ..... *Eomenacanthus stramineus* (Nitz.). Chicken Body Louse.

3a. Head longer than wide; temples rounded; abdominal segments with sclerotization continuous dorsally, or if not so, lateral sclerites are broad and truncate toward the median line 4

b. Head wider than long; temples angulate; abdominal segments with lateral sclerotized bands either slender or attenuated medially, always widely separated dorsally 5

4a. Body long and slender (Figs. 3a-e); abdomen with comparatively few scattered hairs on dorsum, these hairs not confined to form a wide median stripe; front of head evenly rounded; length 2.1-2.5 mm.; only species commonly found on the primary and secondary wing feathers ..... *Lipeurus caponis* (L.). Wing Louse.

b. Body ovate, especially the abdomen (Figs. 4a-c); abdomen with numerous hairs on dorsum, these hairs mostly confined to form a wide median stripe; front of head less evenly rounded, obscurely pointed; length 2.0-2.8 mm.; commonly found standing on their heads among the feathers on the head of a chicken ..... *Cuclotogaster heterographus* (Nitz.). Chicken Head Louse.

5a. Temporal lobes of female acutely angulate, bearing a minute process at the tip of the angulation (Figs. 5a-b); antennae of male enlarged at base, bearing a process on third segment; body stout, reddish-brown color; length 2.1-3.2 mm.; when present may be found especially under the wings and in rump area; rare in the United States ..... *Goniodes dissimilis* Nitz. Brown Chicken Louse.

b. Temporal lobes of female not acutely angulate, not bearing a process at the angulation; antennae of male filiform, without process at the angulation; antennae of male filiform, without process on third segment 6

6a. Each temporal lobe bearing two long prominent bristles directed caudad (Figs. 6a-b); abdominal segments with very slender lateral bands which are widely separated medially; color pale yellow with a translucent appearance; length 0.8-1.5 mm.; common in the fluff of the feathers ..... *Goniocotes hologaster* Nitz. Fluff Louse.

b. Each temporal lobe bearing bristles directed more or less laterad (Fig. 7); abdominal segments with large dark prominent transverse lateral bands; color yellowish-brown to almost black; length

2.7-4.1 mm; occurs on the feathers on various parts of the host's body ..... *Goniodes gigas* (Tasch.). Large Chicken Louse.

LITERATURE CITED

Benbrook, E. A. 1945. List of parasites of domesticated animals in North America. Minneapolis: Burgess. 44p.

Bishopp, F .C. and H. P. Wood. 1939. Mites and lice on poultry. U. S. Dept. Agr. Farmers' Bul. 801 Rev. 26p.

Ewing, H. E. 1929. A manual of external parasites. Springfield, Illinois: Thomas. 225p.

Herrick, G. W. 1915. Some external parasites of poultry, with special reference to Mallophaga, with directions for their control. Cornell. Agr. Expt. Sta. Bul. 359. 39p.

Whitehead, W. E. 1942. Lice and some other external parasites of domestiq animals and poultry in the Province of Quebec. MacDonald College, McGill Univ. Farm Bul. 7. 27p.

AN UNDESCRIBED LEPTOPODID FROM INDIA (Hemiptera)

by

CARL J. DRAKE
Ames, Iowa

The family Leptopodidae is a small group of semiaquatic insects, commonly called shore bugs. Only 19 species are known, including the new form described below. The species are confined largely to southern Europe and Asia, several tropical and subtropical islands of the South Pacific and Indian oceans and Africa and adjacent islands. No species have been recorded from Australia. In their checklist and distributional records of the Leptopodidae of the World, Drake and Hoberlandt (1951, Acta Ent. Mus. Nat. Pragae, 26:1-5) failed to include the record of Usinger (Bull. Brook. Ent. 36:164-165, 1941) of the occurrence of *Patapius spinosa* (Rossi) of the Old World in California. In a recent letter (March, 1953) Dr. Usinger states that this species is now turning up in increasing numbers, and has been found as far south as Glendora in Los Angeles County and as far north as Chico in Butte County, California.

Leptopus scitulus, sp. new

Small, elongate-ovate. Length, 3.10 mm.; width, 1.00 mm. Head brown or reddish brown, slightly shining, often black between the eyes. Eyes blackish, beset with short, scattered, brownish setae. Pronotum and scutellum aeneous-fuscous, sometimes darker, slightly shining, front lobe largely testaceous in a few specimens. Hemelytra white-testaceous with a large black-fuscous, quadrate area (a large semicircular area on each side at middle within the dark area pale like rest of elytra), extending from the basal third (includes apex of scutellum) nearly to middle of membrane, but the ends of the front and hind arms or bands do not attain the outer areas of hemelytra. Body beneath black-fuscous with the hind margins of abdominal segments embrowned.

Eyes large, longer than wide, deeply roundly excavated within, back of the middle, strongly declivent in front, subpendunculate, sparsely beset with setae-like hairs. Dorsal surface between the eyes deeply concave; vertex scarcely wider than an eye, unarmd, a little rugulous, furrowed in front on the median line. Ocelli approximate, placed obliquely at the top of a subglobose tubercle. Antennae long, slender; segment I short, moderately incrassate, moniliform; II much longer than I, rather slender; III and IV very slender, long; measurements—I, 15; II, 45; III, 68; IV, 55. Rostrum testaceous with second segment (first visible) distinctly longer than the third, the former with two extremely long slender spines on each side, the third segment with similar but much shorter spines. Underside of head with numerous extremely long pale hairs and four extremely long pale spines on each side pointed downward.

Pronotum very coarsely punctate, truncate behind, with a few scattered erect brownish hairs, with outer margins distinctly carinate from base to middle of fore lobe, with distinct anterior and posterior lobes; hind lobe convex, sharply rounded, narrowed anteriorly from humeral angles to front lobe; front lobe much narrower than hind lobe, deeply broadly transversely furrowed just behind the collar, with two encircling rows of small areolae in the furrow, part of fore lobe between furrow and hind lobe considerably raised, smooth, shining and impunctate, elevated part distinctly impressed on median line (especially near the middle) so as to separate it into two rounded areas. Scutellum broadly impressed on median line, wider than long (35:25). Hemelytra longer than the abdomen, slightly constricted between the base and middle, then gently roundly narrowed from middle to apex, finely areolate, divided into the usual areas by distinct veins; membrane divided into four large cells, hyaline beyond the fuscous base, cell number one shorter and narrower than two; embolium moderately wide, with areolae not very distinct; corial-claval areas plainly areolate. Wings nearly clear, almost as long as hemelytra.

Legs very long, slender, middle and hind legs unarmed, the anterior acetabula sometimes armed in front with a long slender spine. Anterior femora moderately incrassate, tapering considerably apically, armed beneath with two rows (five spines in a row) of extremely long slender spines, between the large spines armed with very short spines, spines of front row directed obliquely antero-downward, those of hind row pointed obliquely postero-downward; tibiae with two rows of shorter long spines, four spines in a row. Measurement of anterior femora, 78; tibiae, 65. Intermediate femora, 85; tibiae, 85. Hind femora, 90; tibiae, 135. Middle and hind femora slowly tapering apically. In the comparative measurements, 80 units equal one millimeter.

Holotype (male) and *allotype* (female), and 15 *paratypes,* Dehra Dun, India, Nov. 11, 1951, in my collection.

Separated from *Leptopus hispanus* Rambur by the smaller size, color markings of hemelytra and antennal measurements. These same characters and the smooth exterior margins of the hemelytra also separate it from *L. marmoratus* Goeze. *L. travancorensis* Distant is a very distinct and differently colored insect as illustrated in the original description.

SOME OBSERVATIONS ON THE ECOLOGY OF A NORTH AMERICAN CHIGGER *TROMBICULA (EUTROMBICULA) LIPOVSKYANA* WOLFENBARGER, 1952, IN A TENNESSEE COMMUNITY[1]

LAWRENCE R. PENNER, THOMAS FRANCIS, JR., AND GORDON C. BROWN

A number of papers have appeared in recent years contributing to our knowledge of the bionomics of several species of chiggers. Types of localities have been reported as typical haunts of the particular species of chigger concerned. In the case of our common "redbug," *Trombicula (Eutrombicula) alfreddugesi* (Oudemans), Williams (1946) has reported two important niches in the vicinity of Chapel Hill, Orange County, North Carolina, greatest numbers being found, first, under and near blackberry bushes, and second, near the base of pine trees, particularly at the base of those that were in groups of three or more. His collections at other types of localities throughout wooded and semiwooded areas were comparatively meager. He, like Ewing (1929) believed that the host or hosts in question played a part in concentrating the chiggers. The formidable list of hosts for this and other species of chiggers as reported by many authors, including Ewing (1944), Williams (1944, 1946), Wharton (1945), Brennan (1946), Michener (1946), would suggest a diversity of ecological environments for larval trombiculids, largely due to the different habits of the hosts concerned. Michener (1946) for example, reported that *Eutrombicula batatas* (Linnaeus) is a species found in open sunlit places but not in wooded or jungle areas. He found the larvae on grass and weeds, sometimes in great numbers, but not on logs, stumps, and the like, where larvae of certain other species may occur. He found that the larvae survive heavy rains by clinging to weed leaves or grass blades, remaining relatively inactive unless man or animals dislodged them. This species was found to be particularly abundant in the grassy areas around houses and in villages where domestic animals, particularly chickens, were numerous. That chiggers are found on sea birds (Wharton, 1945) is also suggestive that there may be interesting relationships to be discovered concerning the way in which the birds acquire their infestations and from what type of environment. Philip, et al. (1946) reported variable environments for chigger vectors of scrub typhus, such as fields of the common Philippine grasses, "talahib" *(Saccharum)* and "kogan" *(Imperator)*, neglected coconut groves with scrub undergrowth overlying sandy as well as corraline floors, and mountain scrub areas as high as 3000 feet. They, too, cite a diversity of hosts. Ahlm and Lipshutz (1944) and others have reported further types of environments, such as sago palm swamps margined with kunai grass. From this then, one would logically believe that the focal point of heavy chigger infestation which man might acquire would depend on the vertebrate host or hosts and where they spend most of their time during the period when the fed

[1]Contribution from the Department of Epidemiology, School of Public Health, University of Michigan, and the Department of Zoology and Entomology, University of Connecticut. Aided by a grant from the National Foundation for Infantile Paralysis.

chiggers drop off in greatest numbers. This, of course, might depend on whether the environment reached by the nymph would prove suitable for the perpetuation of the life cycle, and on whether the host had been a suitable one for life cycle continuation. Ewing (1944), for example, has already discussed the difficulty of rearing nymphs from man and certain other hosts, and such hosts might actually tend to decrease the future number of chiggers in a given area if they were collecting a large number of the unfed larvae.

The recent report by Wolfenbarger (1952) on the species of the subgenus *Eutrombicula* found in Kansas and surrounding states together with a systematic review of the North American species, has stimulated this belated write-up of some rather interesting data collected eight years ago in a Tennessee community concerning the larvae of his new species, *Trombicula lipovskyana*. Except for certain critical measurements, the larva of this species differs from the larva of *T. alfreddugesi* mainly in that the thicker palpal claw has a deep cleft whereas it is shallow in *alfreddugesi*. Specimens sent in 1951 to Mr. Louis J. Lipovsky, then at the University of Kansas, have been identified as Wolfenbarger's species and insofar as the latter's rather detailed study is now in print, it seems appropriate to report these observations.

CHIGGER COLLECTING IN A TENNESSEE COMMUNITY

On Thursday, August 16, 1945, a good rain fell in the community where the authors were working, the first real rain for several weeks, according to the natives. The next day, August 17, thousands of chiggers were observed and some of these collected in a wooded area in Henderson County, Tennessee, near the small village of Chesterfield. The wooded area is locally known as the Hayes Woods, and when the authors were in the area, a crew of woodsmen was hauling logs from the woods. This was one reason the authors were attracted to the place. The men informed the authors that they were getting chiggers in the woods, in fact, one of them said they were "everywhere around us." Examination of the men on the wagons did not indicate that they were being attacked in very great numbers, although two chiggers were found on the legs of one of the men and scars of earlier infestations were in evidence. The reason for their light infestations was not clear until the authors got into the woods where the trees had been cut. Most of the felled trees were oak, and, although other deciduous varieties were present, there were no pine trees either cut or standing. One old native had the burdensome task of wrapping a heavy chain around a log so that it could be hoisted onto the wagon by the mule team. He appeared to be the only one of the men engaged in this particular occupation. When examined, he was found to have a heavy infestation of chiggers in the arm pits, some on the chest, and almost none on the other parts of his body. About fifteen chiggers were picked from under each arm before the individual tired of the ordeal. It appeared then, that his occupation in the woods had something to do with the degree of chigger infestation under the arms and on the thoracic region, rather than on and between the legs as one might have expected if the chiggers had been obtaining access to the host from a thick layer of ground litter that covered the forest

floor. The other woodsmen who had light infestations did not have this close contact with the logs.

A white sheet was placed over one of the large recently cut logs and left for about ten minutes. Examination of the under side of the sheet revealed a few chiggers. The same results obtained when other freshly cut logs were examined. White plates and large white enameled pans placed in the forest litter did not prove to be effective in obtaining any appreciable number of chiggers; in fact, almost no chiggers could be found at any time in the forest litter with or without their use. Williams (1946) reported the use of the "white dish" method quite effective in his chigger collecting.

It was not until logs and stumps in varying stages of decay were examined that chiggers were found in large numbers, and with few exceptions, almost entirely in association with moss[2] and occasionally liverwort which covered the surface of the logs. The moss seemed to be providing moisture and cover protection for the chiggers. When the moss was disturbed with a stick or approached by a hand or face, great numbers of chiggers would come scampering out, in some places fifty or more in an area slightly more than an inch square. When the stimulus was removed, they disappeared into the moss or crevices of the log. Blowing on the moss also resulted in an appearance or reappearance of the chiggers. What then, would happen to the hapless creatures resting for a moment on top of the logs? It was not difficult to see how a bird or other animal in the woods could acquire a heavy infestation in a very short period of time. One could also see how a tired squirrel hunter, or woodsman, as the case might be, would get a literal "hotseat" if perchance, he sat on one of these "live" logs or stumps.

A sheet was spread over the top of one of the heavily infested logs for a few minutes. Many of the chiggers which crawled on the sheet were collected with a small camel's hair brush. It was soon noticed that they seemed to be confined largely to the part of the sheet that was nearest to the top of the log, so later collecting was accomplished directly from the moss with the brush. When one blew gently on the moss, the chiggers appeared quickly, and a few sweeps with a damp brush collected dozens of them while they scurried about. Between 11 a.m. and 1 p.m. over 2000 chiggers were collected in this manner. Williams (1946) has written of their negative geotropism. The fact that they were invariably near the top of logs or stumps was added evidence of this, but they evidently disliked the open enough to remain under the cover protection of the moss or liverwort except when a proper stimulus was furnished.

White plates and large white enameled pans were placed alternately along the sides of the best collecting logs in the litter of sticks, leaves, etc., but were almost ineffective in helping with chigger collecting. A few chiggers would walk over plates placed on the logs, but the brush collecting method proved to be better for the authors.

---

[2]Professor G. S. Torrey of the Department of Botany, University of Connecticut, believes the moss to be *Platygyrium repens,* which is said to be common on the bark of trees, decaying logs, and stumps through the whole area east of the Rockies, and also in Europe. He also suggested that the liverwort is probably *Madotheca platyphylloidea,* a species described from the Southern Appalachians. The authors are grateful for his identifications.

One of the authors (Penner) allowed 20 chiggers to run up his arm, which they did rapidly. Eleven of these were later found to be attached, eight of them in the left armpit, two on the chest, and one on the abdomen. No other chiggers were acquired from the forest litter. It should be mentioned, however, that one of the authors (Francis) was using dimethyl phthalate as a repellent, and another (Brown) was not in the woods at all. Of the chiggers attaching, the last one dropped off or disappeared in 35 hours. Considerable self-control was required to prevent scratching. When one of the authors (Penner) placed a thin ring of dimethyl phthalate around his wrist and then let a number of chiggers scurry up his fingers, they hastened upward until they were less than an inch from the repellent at which point they made a hurried retreat. Several gained access to soft skin between the fingers and attached while some of them failed to attach at all. The longest time any of these remained between the fingers was less than an hour.

The authors can certainly verify Williams' (1946) remarks about their rapidity of movement. He found that they could run better than a foot a minute, which, according to him, would mean that man would have to run with an average speed of slightly better than 173 miles per hour for four consecutive hours before falling from exhaustion, in order to run as fast for his size as the chigger. In other words, the lowly chigger is really keeping up with the modern world.

Extensive collecting to determine the natural hosts of chiggers was not contemplated nor carried out, but one cottontail rabbit and two box turtles were found to be heavily infested; a few were found on another box turtle and a small blacksnake. One of us (Brown) acquired a few chiggers after walking through tall grass near the town of Lexington, otherwise, except for those acquired experimentally, the authors did not experience any infestations. Numerous natives complained, however, that they had been bothered a lot during the late spring and early summer months. Examination of several chickens, one goose, three hounds, and a kitten did not reveal any chiggers, although other faunal traffic was abundantly evident.

Several half gallon fruit jars were filled with the moss and liverwort covered bark and decaying wood bearing the most numerous concentrations of chiggers, on the morning of August 18th. Collecting at this time did not seem to be quite so good, but there were still plenty to be found. The authors collected chiggers and log debris from about 9 a.m. to 10:30 a.m. in the Hayes Woods, closed the collecting jars being used, rather tightly, and placed them in the back of the collecting station wagon. Here they remained until August 20, while being transported back to Ann Arbor, Michigan. When the chiggers were found to be still alive in the containers, more were collected from the material and others left in some of the jars which were then placed in a 4° C. room. On August 30, chiggers were still alive and two of the jars were shipped by express to the University of Connecticut where they were left at room temperature. until September 20, unpacked, and when live chiggers were still found to be present, they were placed in a refrigrator where the temperature ranged from 33° to 40° F. A few chiggers were found alive in the container on October 28, but later examinations revealed no chiggers. It is not known whether the chiggers observed at the last were able to survive

the ordeal of traveling and temperature changes from Tennessee to Michigan to Connecticut, or whether chigger eggs may have been present in the material. It should be noted that a few adult chiggers were observed on the moss covered logs when the authors were collecting in Tennesse.

Wolfenbarger reports seasonal activity of 1950 larvae of *T. lipovskyana* in Kansas as beginning around June 12, increasing in numbers during July and August, then gradually decreasing until complete disappearance about October 25. He reported larvae from Kansas, Arkansas, and Oklahoma, apparently restricted to moist areas near streams and swamps, with the observation that *T. alfreddugesi* was always found in the same habitat with *T. lipovskyana*. He also reported numerous avian, mammalian, and reptilian hosts for the larvae.

It should be noted that since this was a poliomyelitis epidemic area at the time, aliquots of chiggers collected in this community were quick frozen and later tested in monkeys for the presence of poliomyelitis virus. The results were negative.

SUMMARY

1. A number of observations on the bionomics of chiggers are reported.
2. Chiggers have been found in great abundance in a wooded area in a Tennessee community. Woodsmen required to handle felled logs or individuals who rested on decaying logs and stumps were probably more subject to chigger attack in this area.
3. Collecting methods are described. It is pointed out that the success of collecting methods used may be dependent upon the particular conditions found in a given collecting spot.
4. Several aliquots of chiggers tested in monkeys were negative for poliomyelitis virus.

LITERATURE CITED

Ahlm, C. E. and Lipshutz, J. 1944 Tsutsugamushi Fever in the Southwest Pacific Theater. J. Am. Med. Assn. 124:1095-1100.

Brennan, J. M. 1946 A new genus and species of chigger, *Chatia setosa* (Trombiculidae, Acarina) from Northwestern United States. J. Parasitol. 32:132-135.

Ewing, H. E. 1929 Birds as hosts for the common chigger. Am. Nat. 63:94-95.

Ewing, H. E. 1944 The trombiculid mites (chigger mites) and their relation to disease. J. Parasitol. 30:339-365.

Michener, C. D. 1946 Observations on the habits and life history of a chigger mite, *Eutrombicula batatas* (Acarina: Trombiculinae). Ann. Ent. Soc. Amer. 39:101-118.

Michener, C. D. 1946 A method of rearing chigger mites (Acarina, Trombiculinae). Am. J. Trop. Med. 26:251-256.

Philip, C. B., Woodward, T. E., and Sullivan, R. R., 1946, Tsutsugamushi disease (scrub or mite-borne typhus) in the Philippine Islands during American re-occupation in 1944-45. Am. J. Trop. Med. 26:229-242.

Wharton, G. W., 1945, Two new speces of *Acariscus: A. pulvius* and *A. anous* (Acarinida: Trombiculidae). J. Parasitol. 31:401-405.

Williams, Roger W. 1944, A check list of the mite vectors and animal reservoirs of tsutsugamushi disease. Am. J. Trop. Med. 24:355-357.

Williams, Roger W. 1946 A contribution to our knowledge of the bionomics of the common North American chigger, *Eutrombicula alfreddugesi* (Oudemans) with a description of a rapid collecting method. Am. J. Trop. Med. 26:243-250.

Wolfenbarger, Keith A. 1952 Systematic and biological studies on North American chiggers of the genus *Trombicula,* subgenus *Eutrombicula* (Acarina, Trombiculidae). Ann. Ent. Soc. Am. 45:645-677.

WESTERN WHEAT GRASS, AN OVER-SUMMERING HOST OF *ACERIA TULIPAE* (K.), VECTOR OF STREAK-MOSAIC OF WHEAT[1]

REGINALD H. PAINTER AND JOHN SCHESSER[2]

Slykhuis[3] has shown that the Eriophid mite, *Aceria tulipae* (K.) is readily capable of transmitting the streak-mosaic of wheat which caused severe damage to the western Kansas wheat crop in 1949. Growing wheat, however, is generally absent during at least part of the summer and hence does not furnish a satisfactory year-round host. Keifer[4] has suggested that only perennial plants can furnish such satisfactory hosts for Eriophyid mites.

In the summer of 1953 a search was made for possible perennial hosts following a limited outbreak of the mosaic in north ceneral Kansas. During this time the mite, *Aceria tulipae* (K).[5] was found on western wheat grass, *Agropyron smithii* Rybd., a common grass along wheat field borders in central and western Kansas. Eriophyid mites have been found on plants of most of the colonies of western wheat grass examined, in one or more localities, in 24 counties in Kansas from Rawlins and Republic on the north to Riley on the east and Barber county on the south. These mites have been found on *Agropyron* in several other Kansas counties by R. V. Connin and other entomologists working on wheat pests. It probably may be expected wherever western wheat grass occurs in the state. Some of the western wheat grass on which mites have been found have been considerable distances from wheat fields.

If present, colonies of the mites may be found most readily in whorls of non-fruiting stems of *A. smithii,* altho isolated individuals have been seen on older leaves and in the young spikelets. All stages of the mite from egg to adult may be found in the whorl. The tightly rolled central leaves with deep furrows on the upper surfaces apparently give satisfactory protection.

Mites brought in on *Agropyron* from five counties have been transferred to wheat plants in the greenhouse. Twelve plants developed colonies among 43 plants on which attempts to establish colonies were made. Part of these colonization attempts took place during a period when daytime temperatures in the greenhouse were well above 100°F. Under lower temperatures better establishment might have occurred. The mite was colonized on *Agropyron* from individuals previously collected or reared on wheat.

A group of *Agropyron* stems bearing the Eriophyid mites were collected in Smith County, Kansas, and placed between an electric fan and a flat of seedling wheat. After the wind from the fan had blown across the *Agropyron* stems and young wheat plants for parts of several days, colonies of

---

[1]Contribution no. 618 Department of Entomology, Kansas State College.

[2]Professor of Entomology and Graduate assistant, respectively.

[3]Slykhuis, J. T. Wheat streak mosaic and factors related to its spread. Canad. Jour. Agr. Sci. 33:195-197. 1953.

[4]Keifer, H. H. The Eriophyid mites of California. Calif. Insect Survey Bul. 2 (1), 123 p. 1952.

[5]The authors are indebted to H. H. Keifer of the California State Department of Agriculture for identifications of several samples of these mites.

mites and thrips developed on the wheat. The mites may have been blown by the wind from the fan or carried on the thrips. The relative size of mites and thrips is such that the wind means of transfer is more probable. Transportation of the mite by wind already has been reported by Slykhuis in informal conferences at Manhattan, June 2, 1953, and by Slykhuis and Andrews[6]

Besides thrips, other arthropods associated with the *Aceria* on *Agropyron* have been the mite *Paratetranchus pratensis* (Banks) and a leafhopper nymph. While *Aceria* does not make webs, individuals have been seen climbing on webs made by *Paratetranchus* and may be transported in the wind by aid of such webs. Individuals of *Aceria* have been seen climbing on a leafhopper nymph that feeds in the whorl of *Agropyron*.

While individual mites, apparently *Aceria tulipae*, have been found on plants of other grasses notably *Aegilops cylindrica* Host. in or around mite-infested wheat fields, the western wheat grass is the only wild grass species so far known on which *Aceria tulipae* can develop extensive colonies in the field.

The western wheat grass, *Agropyron smithii* appears to be immune to wheat streak-mosaic according to Sill and Connin[7]. Thus, while *Agropyron* makes possible the over-summering of the mite *Aceria tulipae* and is a potential source of infestation of wheat, a source of the mosaic for transmission must still be sought. Several of the wheat plants that carried colonies of mites from *Agropyron* were tested for mosaic with negative results.

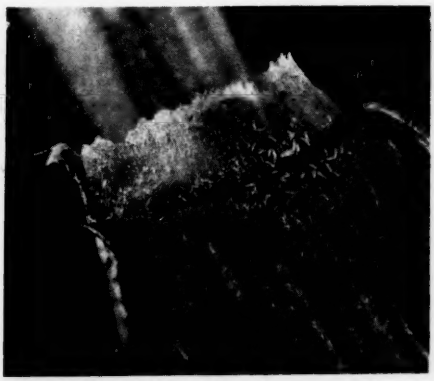


Fig. 1. Wheat curl mite, *Aceria tulipae* (Keifer) at base of wheat leaf near ligule. Magnification approximately 11 times.

[6]Slykhuis, J. T. and Andrews, J. E. Wheat streak mosaic in Alberta and its control. Mimeographed, unnumbered publications. Canad. Dept. Agr. Sci. Expt. Farms Services, Lethbridge, Alberta, Aug. 1953.

[7]Sill, W. H., Jr. and Connin, R. V. Summary of the known host range of the wheat streak-mosaic. Kans. Acad. Sci. Trans. (in press).

MELECTA PACIFICA ATLANTICA IN THE CENTRAL UNITED STATES (Hymenoptera, Anthophorinae)[1]

by

CHARLES D. MICHENER
Lawrence, Kansas

The bee described as *Melecta atlantica* Linsley (1943) is one of the rarest large bees in the eastern half of the United States. It was described from Georgia and later recorded from New Jersey (Michener, 1948). A single male in the Snow Entomological Museum is labeled Douglas County, Kansas, 900 feet altitude, May (F. H. Snow). Through the courtesy of Wilbur R. Enns of the University of Missouri a single female has been received from Ranken, St. Louis County, Missouri, April 28, 1935 (E. P. Meiners). Dr. P. D. Hurd of the University of California reports *(in litt.)* a single male from Cheaha State Park, Alabama, April 26, 1940 (E. C. Van Dyke) in the collection of the California Insect Survey.

The Missouri female has the thoracic pubescence red as in *M. pacifica fulvida* Cresson, known from the Rocky Mountains to California, and like certain Georgian specimens has some pale (red) hairs among the black on the first metasomal tergum. The red coloration suggests that *M. atlantica* may be only subspecifically distinct from *pacifica*. The Kansas and Alabama males have pale (not red) hair, however, and agree with the characters of male *atlantica* as described previously (Michener, 1948) except that the minor genitalic differences there mentioned do not hold. The seventh metasomal tergum, at least in the Kansas specimen, is more deeply notched than in males of *pacifica fulvida,* but it is often slightly notched in them. For these reasons, coupled with extreme similarity of other characters (as implied by Hurd, 1943), *atlantica* is placed as a subspecies of *pacifica.* From a study of the distribution of western American forms of *pacifica* (see Hurd and Linsley, 1951), combined with the meager data on the distribution of *atlantica,* it seems probable that the species has a more or less continuous distribution from coast to coast.

REFERENCES

Hurd, Paul D., Jr. 1953. Notes on the melectine bees of Mexico, Jour. Kansas Ent. Soc., vol. 26, pp. 35-37.

Hurd, P. D., Jr. and E. G. Linsley. 1951. The melectine bees of California, Bull. California Insect Surv., vol. 1, pp. 119-140.

Linsley, E. Gorton. 1943. The genus Melecta in eastern North America and Puerto Rico, Jour. New York Ent. Soc., vol. 51, pp. 225-227.

Michener, Charles D. 1948. Notes on the American bees of the genus Melecta, Proc. Ent. Soc. Washington, vol. 50, pp. 15-18.

[1] Contribution number 873 from the Department of Entomology, University of Kansas, Lawrence, Kansas.

PRICE OF BACK VOLUMES

Back Volumes $2.50 per volume

Subscriptions for back volumes or numbers should be sent to Donald A. Wilbur, Department of Entomology, Kansas State College, Manhattan, Kansas.

CHARGE TO AUTHORS FOR REPRINTS

Number of Reprints	*Charge per page*	*Min'm. chg. 1-2 pages*
100	1.35	3.75
150	1.68	4.50
200	2.01	5.25
250	2.34	6.00
300	2.67	6.75
350	3.00	7.50
400	3.33	8.25
450	3.66	9.00
500	3.99	9.75

CONTENTS OF THIS NUMBER

Paul Bowen Lawson 81

Utah Celery Field Aphids—1952
GEORGE F. KNOWLTON AND HOWARD E. DORST 83

Notes on Mexican Meloidae (Coleoptera)
RICHARD B. SELANDER 84

Biology of the Common Red Spider
A. J. WILLIAMS 97

Neotropical Miridae, LXXIII: A New Genus and Four New Species of Bryocorini (Hemiptera)
JOSÉ C. M. CARVALHO 100

A New Species of Erythroneura (Homoptera, Cicadellidae) From Kansas
R. N. SINHA AND R. H. BEAMER 105

A Taxonomic Study of Adult Chicken Lice Found in the United States
H. E. FAIRCHILD AND PAUL A. DAHM 106

An Undescribed Leptopodid From India (Hemiptera)
CARL J. DRAKE 111

Some Observations on the Ecology of a North American Chigger *Trombicula (Eutrombicula) Lipovskyana* Wolfenbarger, 1952, in a Tennessee Community
LAWRENCE R. PENNER, THOMAS FRANCIS, JR., AND GORDON C. BROWN 113

Western Wheat Grass, an Over-Summering Host of *Aceria Tulipae* (K.), Vector of Streak-Mosaic of Wheat
REGINALD H. PAINTER AND JOHN SCHESSER 118

Melecta pacifica atlantica in the Central United States (Hymenoptera, Anthophorinae)
CHARLES D. MICHENER 120